Session I

Tanks Panel Session

Thomas Gutmann, U.S. Department of Energy, Savannah River Operations Office

Across the DOE Complex, there are hundreds of deteriorating underground storage tanks requiring remediation. Discussion will center on safe, reliable, and economical methods to characterize, retrieve, treat, and dispose of the tanks, accompanying wastes, and contaminated soils. Methods to minimize tank content releases before and during remediation are also sought.

Application of FWENC Stabilization Process to Enhance Treated Radioactive Sludge Leach Resistance in Surrogates and Actual Sludges

John W. Barton and Roger D. Spence, Oak Ridge National Laboratory

Representative sludge samples from two ORNL storage tank farms (W23, MVST), along with two sludge surrogates, were treated using a process developed by the Foster Wheeler Environmental Corporation (FWENC) for stabilization of Oak Ridge tank sludges. The approach permits waste consolidation by removing free water and immobilizing RCRA contaminants using additives. The results presented here were collected as an independent assurance for the Department of Energy of the viability of the FWENC process for compliance with WACs and storage needs prior to shipping of final waste forms. Data from water accumulation affinity and Toxicity Characteristics Leaching Procedure (TCLP) performance tests for both stabilized surrogates and actual sludges will be shown. Stabilized wastes were also subjected to freeze/thaw thermal cycling, long-term storage under conditions simulating East Tennessee's ambient weather, and radiation durability testing. These latter tests were designed to determine sustainability of TCLP performance and free water accumulation, which are important considerations for transport and storage of tank final waste forms.

John Barton (1994, Ph.D. Chemical Engineering, University of Virginia) is a Research Engineer at ORNL and conducts research on projects ranging from biotechnology to mathematical modeling. Roger Spence (1975, Ph.D. Chemical Engineering, North Carolina State University) is a Senior Research Engineer with extensive experience in waste stabilization treatment methodologies.

In Situ Plasma Remediation of Underground Storage Tanks

Louis J. Circeo, Georgia Tech Research Institute

Plasma arc technology is an emerging technology which uses high power levels of electricity (100 kW to 10 MW) to create a plasma (a form of artificial lightning), with temperatures exceeding 7,000°C. The development of a stable, efficient, and cost-effective heating source over three times hotter than conventional fossil fuels has opened the door to a wide-range of thermal remediation applications previously not possible. The very high temperatures and energy densities associated with plasma technology have fully demonstrated its potential to remediate many waste materials in an environmentally safe and cost-effective manner. Materials vitrified with plasma arc torches have readily passed all standard leaching tests.

Among the promising waste disposal technologies under consideration is the in situ plasma remediation of underground storage tanks (USTs). The basic concept of this application is simple and straightforward. Using a plasma torch, the interior of a storage tank and its contents could be brought up to essentially any temperature short of melting/collapsing the tank. Thus, a plasma torch could be operated inside a UST until required temperatures and residence times were achieved to remediate the specific contaminants resident in the tank. The contaminants in the UST would either volatilize or vitrify. If solid contaminants are resident in the UST to a considerable depth, the plasma torch could be operated in a grid of prepared boreholes within the contaminated material in order to remediate the contaminants through the in situ plasma vitrification process. A standard offgas treatment system would collect and treat the gaseous effluent from the underground storage tank.

Louis J. Circeo, is a Principal Research Scientist in the Safety, Health and Environmental Technology Division, Georgia Tech Research Institute, Georgia Institute of Technology. He holds a Ph.D. in Civil Engineering from Iowa State University. Dr. Circeo has worked at the Lawrence Livermore National Laboratory, the Defense Atomic Support Agency, and the Defense Nuclear Agency. He is a former director of the U.S. Army Construction Engineering Research Laboratory. Dr. Circeo established the Plasma Applications Research Facility at Georgia Tech in 1990, and is conducting an active research program related to engineering and environmental applications of plasma arc technology.

In-Line Monitoring of Slurry Transport Properties

Tom Hylton, Oak Ridge National Laboratory

The Gunite and Associated Tanks project at the Oak Ridge National Laboratory removes radioactive sludge from the tanks by mixing the sludges with liquids to create slurries and then transporting the slurries cross-site by pipeline to another storage tank. A plug in the pipeline is especially undesirable because the slurries are radioactive. The options for dealing with a plug that cannot be removed by conventional methods are to build a new pipeline and remediate the plugged pipeline at a later date or to locate and excise the plugged sections of the pipe. Either option would be costly and delay the processing schedule. Continuous monitoring of the slurry transport properties (e.g., density, suspended solids concentration, and particle size distribution) was selected as the method for reducing the risk of pipeline plugs. An Endress + Hauser Promass 63M Coriolis meter was used to continuously monitor the density of the slurries and also to indirectly determine the suspended solids concentration. A Lasentec M600P instrument, which operates on the principle of a focused beam reflectance measurement, was used for monitoring the particle size distribution. A summary of the testing performed and the results obtained will be presented.

Tom Hylton, a research and development engineer in the Chemical Technology Division at the Oak Ridge National Laboratory, has studied the mobilization of sludges and the transport of slurries for 10 years. He is the author of several technical reports and related publications in this area.

Alternative HEPA Filter Media

Duane J. Adamson, Westinghouse Savannah River Site

A sintered metal filter and ceramic monolith filter have been tested as in situ regenerable High Efficiency Particulate Air (HEPA) filters for application to high-level waste (HLW) tanks. The filters were subjected to a hostile environment to simulate conditions that challenge the HLW tank ventilation systems. Studies have found that both filter media were insensitive to high humidity or moisture conditions. The filters regenerated to approximately a clean filter status even after numerous particulate loading and in situ cleaning cycles. Both filters have passed the DOP efficiency test with a 99.97% or greater retention efficiency.

The Defense Nuclear Facility Safety Board Technical Report entitled HEPA Filters Used in the Department of Energy's Hazardous Facilities found that conventional glass fiber HEPA filters are structurally weak and easily damaged. This innovative approach of the alternative HEPA filter media may be a significant improvement upon the shortfalls of conventional disposable HEPA filters.

Duane J. Adamson is presently employed by the Westinghouse Savannah River Company at the Savannah River Technology Center. He is a Principal Engineer with 13 years experience in research and engineering of high level radioactive waste handling systems. Mr. Adamson has a Master of Science in Mechanical Engineering from the University Of South Carolina and a Bachelor of Science in Mechanical Engineering from the University Of Kentucky.

Overview of SRS Developed Remote Tank Technologies and Tools

Steven L. Tibrea, Westinghouse Savannah River Company

The Savannah River Technology Center (SRTC) provides operational support of various Savannah River Site processes. A number of special devices have been developed and fielded to aid in the operation, inspection, characterization and closure of radioactive containing waste tanks and process transfer lines.

This presentation provides an overview of devices developed or built by SRTC to support waste tank operations including samplers, inspection systems, monitoring systems, and devices to assist in closure of waste tanks and transfer pipe lines.

Steven L. Tibrea, P.E. is the Manager of the Savannah River Technology Center's Remote and Specialty Equipment Section. His group is responsible for developing special tooling and devices for operations in hazardous and inaccessible environments. Mr. Tibrea has been associated with equipment development at SRTC for the past eleven years.

Determination of Corrosion Species in High-level Nucler wastes using Raman Spectroscopy

David T. Hobbs, Westinghouse Savannah River Company and J. M. Bello and R. W. Forney EIC Laboratories, Inc.

Corrosion of high-level waste (HLW) storage tanks is limited by controlling the liquid phase chemistry of key species including nitrate, nitrite and hydroxide. Current practice involves taking liquid phase samples from the tank, transporting the samples to an analytical laboratory and performing two different analytical methods to determine the concentrations of the key corrosion species. This practice is expensive, time consuming and results in radiation exposure to personnel. We will present results from an evaluation of a Raman spectroscopic method for the in-tank determination of nitrate, nitrite and hydroxide. This method is being developed in combination with an electrochemical noise technique for use in HLW tanks at the Savannah River Site (SRS). The evaluation includes measurements with radioactive samples from both tank farms at the SRS.

David T. Hobbs (BS, Chemistry, University of North Carolina at Chapel Hill, 1974; PhD, Inorganic Chemistry, Vanderbilt University, 1979) is a Senior Fellow Scientist at the Savannah River Technology Center with 16 years of experience studying the chemistry of high-level nuclear wastes. Current research interests include a better understanding of the actinide and inorganic chemistry associated with high-level nuclear wastes, development of improved pretreatment processes for radionuclide separations and in-situ characterization techniques.

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Session II

Using Risk for Remedial Decisions Panel Session

Jerry Nelsen, U.S. Department of Energy, Savannah River Operations Office

Human health and environmental risks are sometimes difficult to quantify and to communicate to stakeholders, with the public often perceiving risks greater than they are. Abstracts are requested on methods used to calculate risks and to effectively present the results to the stakeholders without the tendency to be overly conservative.

Human Health Risks Of Heat Stress Encountered During Remediation Activities

Wayne S. McKenna; Bob Galloway; and Paula J. Slavin, Sandia National Laboratories

During the remediation of the Sandia National Laboratories/New Mexico (SNL/NM) Classified Waste Landfill, the number one risk that is present during summer operations is heat stress. Since the safety of the workers is the top priority for this project, implementing training, environmental and medical monitoring procedures, specifying Personal Protection Equipment (PPE), and selecting the proper mitigation actions for the remediation processes was a unique challenge.

Personnel performing laydown operations, excavation, sorting and segregation of artifacts, and component disassembly operations outdoors are exposed to the risk of heat stress. To comply with OSHA regulations, personnel should be monitored and mitigation actions with an appropriate work/rest schedule should be implemented to protect workers from heat stress. Training personnel on the effects of heat stress and protective measures utilizing an Integrated Safety Management System approach is the first step to reduce the risk. Mitigation actions including modifying PPE, changing the work environment, and administrative controls are then implemented. Worker's feedback resulting from mitigation actions for heat stress in daily work activities was a key factor in reducing the risk of heat stress.

Wayne Mckenna has over fourteen years experience in water chemistry, industrial hygiene, environmental sampling, and managing small site remediation projects for DOE and Sandia National Laboratories, SNL. He is currently the Site Safety Officer for the Classified Waste Landfill remediation project at SNL in Albuquerque, New Mexico.

Successful Risk-Based Decision Making at Fort Campbell--A Model for Success

Dennis Miller, Advanced Infrastructure Management Technologies (AIMTech), Lockheed Martin Energy Systems

AIMTech's Risk Assessment Strategy (RAS) helps its customers make defensible risk management decisions that optimize cleanup efficiency and maximize protection of human health and the environment. RAS is designed to provide a risk assessment framework that will ensure the consistent use of risk assessment methods at sites and allow for comparable results to be used in risk management.

The strategy forms the basis for planning and executing all environmental work and involves all stakeholders (base personnel, contractors, regulators, and the public). RAS is a three-tiered approach designed for specific environmental needs and incorporates the latest risk information available through the Risk Assessment Information System developed by Oak Ridge National Laboratory.

RAS implementation at Fort Campbell involved a tiered human health and ecological risk-based corrective action approach for a variety of sites (landfills, motor pools, outfalls). This facility-specific RAS evaluates and preestablishes all site-related chemical constituents and applicable exposure pathways and incorporates applicable state, federal, and military guidance.

Cost savings at Fort Campbell have been achieved through reducing regulatory negotiations, expediting decision-making using previously agreed-upon action levels, and focusing limited funding on risk management priorities.

Dennis Miller is the technical program lead for risk analysis for Advanced Infrastructure Management Technologies, Lockheed Martin Energy Systems. In this capacity, he manages human health and ecological risks through the development and application of risk analysis methods. Mr. Miller holds an M.En. in environmental sciences and a B.A. in zoology.

Evaluation of Foodweb Modeling at the INEEL

Robin Lee VanHorn; Celeste Marsh; and Scott Perry, Idaho National Engineering and Environmental Laboratory

The Idaho National Engineering and Engineering Laboratory (INEEL), a Department of Energy facility, is surrounded by 890 square miles of cool desert ecosystem characterized by shrub-steppe vegetative communities. This large complex superfund site has nine "waste area groups" and multiple contaminants. The INEEL is systematically evaluating risk to it's ecological receptors. Initial assessments used foodweb modeling to calculate the potential exposure of ecological receptors to contaminants in various media. These foodweb models used literature values, which are primarily based on agricultural studies, for transport of contaminants from soil to ecological receptors. Exposure modeling accuracy is dependent on the quality of input parameter values and the validity of the model's structure (i.e., the degree to which it represents the actual relationships among parameters at the site) (EPA 1997). Site-specific field measurements of tissue residue levels (concentrations) are the most accurate exposure assessments. In 1997, data was collected both on and off the facility to support the development of site-specific data at the INEEL. These data were compared to the literature values and modeling used in initial risk assessments. Results of this study, a comparison and discussion of problems or lessons learned (i.e., nondetect, potential differences in uptake in areas of greater contamination, and selection of sites) will be presented.

Robin Lee VanHorn is an advisor scientist at the Idaho National Engineering and Environmental Laboratory (INEEL). She is currently a task lead for the WAG 10 Operable Unit (OU) 10-04 Ecological Risk Assessment and Comprehensive Remedial Investigation/Baseline Risk Assessment for the INEEL.

Are We paying too Much to Reduce Radiological Risks?

Herbert Inhaber, Risk Concepts

DOE expenditures on radiological risks are much higher (by a factor of about 5,000) than expenditures on non-radiological risks, such as accidents.

The eight major categories of Nevada Test Site (NTS) risks are: contaminated soils, mostly from above-ground tests; radioactive waste management sites, mostly for low-level wastes; underground test areas; transportation risk (mostly of low-level waste from other DOE sites); radiological and chemical risks to workers; occupational injuries to workers, other than radiological or chemical; large accidents, such as aircraft hitting certain facilities; and present measured or estimated risks off-site, such as documented in EPA studies.

The largest source of risk is workers from sources other than radiological and chemical. Transportation off-site is about one-third less, and is almost completely non-radiological. A factor of about 30 lower is transportation on-site, again almost completely non-radiological. The fourth highest is workers risk due to radiological and chemical sources.

NTS budget requests for Defense Environmental Restoration and Waste Management for fiscal year 2000 were $90.2 million; for Environmental, Safety and Health $2.4 million.

Expenditures per fatality are about 5,000 times greater for radiological as opposed to non-radiological deaths. Although DOE concentrates most of its risk-reduction measures on radiological sources, results indicate that by far the largest proportion of risk derives from non-radiological sources. This suggests a vast misallocation of resources, if those resources are supposed to reduce risk.

Herbert Inhaber is President of Risk Concepts. He holds a Ph.D. in physics and mathematics. With almost 30 years experience in risk and environment, Dr. Inhaber has published about 150 papers in journals and books. He is the author of a forthcoming article on risk in the McGraw-Hill Standard Handbook of Environmental Sciience, Health and Technology.

Evaluating the Behavior of Chlorinated Hydrocarbon Plumes in Ground Water Using Plume Population Studies

Walt W. McNab, Jr.; Richard Ragaini; and David W. Rice, Lawrence Livermore National Laboratory

Ground water data were collected and analyzed from approximately 80 sites across the United States in an attempt to quantify the effects of reductive dehalogenation and other variables on plume behavior. Statistical analyses indicated significant relationships between plume length and the strength of the source term and mean site ground water velocity. Principle component analyses demonstrated that significant differences exist in the behavior of chlorinated hydrocarbon plumes at sites with evidence of reductive dehalogenation and those without. Moreover, after accounting for biases in the data collection process, chlorinated hydrocarbon plume lengths at sites where reductive dehalogenation occurs were found to be significantly shorter on average, by roughly a factor of two, than those where it does not. These differences were found to be time-dependent. The population-oriented perspective offered by this type of study can provide insights into plume behavior that are independent of site-specific influences such as heterogeneities and unique release histories. Thus, the findings may be of interest to regulators and stakeholders tasked with making broad policy decisions with respect to ground water cleanup priorities. To facilitate the use of the data set assembled by this study in additional analyses, data access and visualization tools being developed and will be presented.

Work performed under the auspices of the U.S. Department of Energy by Lawrence Livermore National Laboratory under Contract W-7405-Eng-48.

Walt W. McNab, Jr., Ph.D. is an environmental scientist at Lawrence Livermore National Laboratory. Dr. McNab holds a B.A. in geology and an M.S. and Ph.D. in hydrogeology from U.C. Berkeley. His research interests include reactive transport modeling, aquifer geochemistry, the use of statistical tools for studying contaminant plume behavior, and ground water treatment technology development.

Successful Risk-Based Alternative Studies for the High-Level Waste and Facility Disposition EIS

A. Unione, Enercon Services, Inc.

DOE has recently released the High Level Waste (HLW) Environmental Import Statement (EIS) for public comment in the midst of much debate concerning appropriate future HLW and facility management options. At the initial stages of the National Environmental Policy Act (NEPA) process, DOE faced several issues that could dramatically impact the results of the NEPA action. Many treatment alternatives and options had been identified in EIS scoping actions. However, most were first-of-a-kind thermal or chemical treatment technologies that were yet to be demonstrated on the stored wastes at Idaho National Environmental and Engineering Laboratory. The potential for technical, cost, and safety issues was significant. Relationships with the EPA and the state government that drove the need for a NEPA action threatened to create considerable difficulty in obtaining agreement on a preferred alternative. A defendable basis for selecting treatment alternatives and a preferred alternative had to be developed.

Using an innovative approach, we applied a programmatic risk process at several phases of the EIS activity, supplying DOE with integrated risk information for selecting alternatives and communicating potential discriminators to internal and external stakeholders. Risk Based Alternative Studies (RBAS) programmatic risk methods were used to estimate financial risks (excessive life cycle implementation costs), mission risk (not implementing the alternative within the performance period), and worker risk (additional industrial, occupational, and nuclear safety impacts during the implementation of treatment alternatives).

The RBAS programmatic risk approach was quantitative in nature. It allowed uncertainties in basic data to be correctly propagated to estimate risk to the value of implementing a proposed environmental management alternative. It supported more accurate dialogue with stakeholders who tend to inherently understand the nature of risks posed by nuclear and chemically hazardous wastes but tend to overestimate them, and it identified critical information needs and technical information development requirements.

As the NEPA action enters the public comment phase, the total risk approach in RBAS is being to support the development of a preferred alternative. In particular, the process is being used to supply the Decision Support Team with a capability to compare alternatives, integrate EIS information effectively at a top level, and screen potential hybrids.

A. Unione has 27 years of professional experience in systems engineering and risk management. His technical experience has emphasized the use of risk based approaches for decision making, regulatory compliance, cost benefit determination and public interaction. Dr. Unione's accomplishments include pioneering applications of risk assessment, risk management and risk communication to decision making processes involving large capital investments.

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Session III

Sampling Panel Session

Phil Prater, U.S. Department of Energy, Savannah River Operations Office

DOE is required to collect and analyze samples to characterize contaminated sites, stored wastes, waste in tanks, and contaminated facilities prior, during, and after environmental restoration activities. Input is requested on procedures, protocols, and processes developed to sample soil, water, hazardous waste, spent fuel, high level waste, and other similar media.

Well Redundancy Assessment with Geoscience and Geostatistics

Cary Tuckfield, Westinghouse Savannah River Company

Purge Water Management System (PWMS): is an innovative ground water management pollution prevention, waste minimization, and cost saving process that is presently being implemented at Savannah River Site (SRS).

The PWMS was developed and patented at SRS to address the regulatory requirements for management of purge water from certain wells containing low levels of hazardous, radioactive and mixed waste. PWMS is a closed-loop, non-contact system that returns purge water back to the originating aquifer after a sampling event without altered the water quality, thus eliminating any need for waste management.

Accelerated Site Technology Deployment (ASTD) has been approved by DOE to deploy the PWMS on an accelerated schedule under the (ASTD) program. The proposed ASTD schedule based on joint funding (by SRS-ERD) accelerates the schedule to deploy PWMS at a number of wells in FY 1999 and to be fully deployed at 396 wells in about 4 years. Early deployment significantly reduces costs for groundwater monitoring The initial investment of $5.7 M over 5 years will results in a $15.8 M savings over the life of the program, 30 years for a net savings of $10.1M. (This is an average of $1,300 dollars a year per well after implementation.

No Abstract Submitted.

Using Cone Penetrometer Technologies to Characterize Radiological Waste Sites

Wes Bratton, Applied Research Associates, Inc.; Wilhelmina C. Dickerson, P.E., Applied Research Associates, Inc.; Jeff Johnson, IT Corporation

A novel approach was taken for the site characterization of locations where possible radionuclides we disposed of at R-MAD, Area 25, Nevada Test Site, and the S-Tank Farm at the Hanford Facility. The R-MAD area was used for the research and development of nuclear rockets during the late 50's and early 70's. During this time, primarily solid and some liquid wastes were dumped in unlined pits and trenches at the site. The radionuclides of concern are activation products and mixed-fission products including Cobalt-60, Cesium-137, Strontium-90, Niobium-94, and potential fuel particles. The site was investigated using a cone penetrometer consisting of standard CPT sensors, a gamma spectroscopy module, and a soil gas sampling module. The gamma spectroscopy module consisted of a downhole sodium iodine crystal combined with an uphole spectroscopy system used to detect gamma emitting particles. Over 100 penetrations were made to characterize the site over a period of four weeks. Several regions of high counts were encountered, although no contamination was brought back to the surface. The waste generation from the CPT characterization activities was nearly zero. The details of the results will be discussed in the final paper. A similar approach was used in the S-Tank Farm at the Hanford facility. Results from the S-Tank Farm will also be discussed.

Wes Bratton received his Ph.D. in Civil Engineering in 1991. He has been working on subsurface environmental quality issues for the past nine years, focusing specifically on Cone Penetrometer Technologies. Some of the sensors that Dr. Bratton has worked on include laser induced fluorescence, Raman Spectroscopy, X-Ray Fluorescence, Gamma Spectroscopy, pH, and Oxidation/Reduction Potential.

Cost-Effective Sampling Using the EasyPump at LLNL

Greg Howard, Lawrence Livermore National Laboratory

The cornerstone of any ground water investigation/remediation effort is ground water sampling, which produces quality assured data. At Lawrence Livermore National Laboratory (LLNL) we have deployed innovative sampling technologies that are efficient, cost-effective, and produce data of assured quality.

The most accepted sampling technique includes the purging of three casing volumes, or the achievement of stability of various water quality parameters prior to sampling. This technique is designed to ensure that the sample is representative of the water in the formation. Other techniques are based upon studies which have demonstrated that horizontally flowing ground water within the screened interval of a monitor well is representative of the formation water. These techniques have been named MicroPurge, Low Volume Purge, Passive Sampling, etc. EasyPump is an innovative and efficient sampling process developed and in use at LLNL. Use of the EasyPump now allows Specific Depth Sampling. This technique provides results that are equivalent to the MicroPurge type techniques while cutting back on equipment costs, eliminating pre-sample purge water, reducing the time it takes to sample a well, and reducing health risks to the sampler.

Work performed under the auspices of the U.S. Department of Energy by Lawrence Livermore National Laboratory under Contract W-7405-Eng-48.

Greg Howard joined the LLNL Environmental Measurements Division in 1982 and the Environmental Restoration Division in 1984. He is currently a Subproject Leader and the Sampling Coordinator for the Livermore Site. Mr. Howard has made presentations on specific depth sampling throughout the DOE complex and is the inventor of the EasyPump.

Validation of a Non-intrusive Characterization Technology at Ashtabula, Fernald and Oak Ridge

Dale Pflug, Argonne National Laboratory; Paula Kirk,Bechtel Jacobs; Michael Krstich EMS; Jeff Kulpa, RMIESAshtabula site; Frank Miller, Fluor Daniel Fernald

Adequate characterization has emerged as an important prerequisite as projects move toward remedial design. Intrusive characterization can be prohibitively expensive to complete and has associated waste management and other obstacles. Minimally intrusive characterization tools can help to reduce the cost and uncertainty while filling critical data gaps. Some of these tools require independent validation to confirm the expected results that can be achieved. A validation team of technical experts representing CMST, Industry Programs, Site Project Teams, the SubCon Focus Area, ITRD and TechCon was established in early 2000 to examine data from tests of a non-intrusive characterization tool at Ashtabula, Fernald, and Oak Ridge sites to be conducted during the summer of 2000.

Testing will include examination of the location and depth of trenches and pits in a 0.25 acre of a landfill. In addition, the tests will include characterization of approximately 1.5 acres of ground water plume for TCE, DCE, and Technetium 99, examination of contaminants under building slabs at several sites for uranium, beryllium, and TCE contamination, and examination of a scrap metal yard for uranium contamination. This presentation will examine the data from these tests, compare this data against confirmation sampling and present the validation team's conclusions and recommendations for future utilization of this technology.

Dale Pflug has a B.S. in Engineering from the University of Pittsburgh. He has more than 30 years in the environmental field with broad experience in remediation, waste water treatment and technology applications. Mr. Pflug is currently a Senior Program Manager at Argonne National Laboratory

Accelerated Sampling and Analysis for Dioxins/Furans

Clarence Whitworth; Dan Battleson; John Montgomery; Roland Rees; and Ken Reick, MSE Technology Applications, Inc.

Existing methods for the determination of dioxins/furans in offgas, air, soil, and water matrices generally involve complex and time-consuming sampling, extraction, and analysis procedures, with a total analysis turnaround time of days to weeks. Under the direction of the DOE Mixed Waste Focus Area, MSE Technology Applications has been developing a thermal desorption-based approach to dioxin/furan sampling and analysis. The thermal desorption-based technique reduces the combined pre-concentration, extraction, and analysis time from days or weeks to a few hours. To date, MSE has focused on adapting the thermal desorption approach to offgas sampling and analysis, however, thermal-desorption appears to lend itself to rapid analysis of soil and water samples. For soil samples the soil matrix is in effect the thermal desorption "adsorbent" material; for water samples a suitable adsorbent material, such as diatomaceous earth, could be used to preconcentrate the analyte during sampling. For the TIE workshop, MSE will present the results of thermal desorption-based sampling and analysis of incineration offgases and particulate, and describe approaches to adapting the method to sampling and analysis of waters and soils for dioxins/furans.

This work is being conducted through the DOE National Energy Technology Laboratory at the Western Environmental Technology Office under DOE Contract Number DE-AC22-96EW96405.

Clarence Whitworth holds a Ph.D. in analytical chemistry. Relevant work experience includes management of an environmental analysis laboratory conforming to EPA Contract Laboratory Program requirements; development and validation of methods for analysis of water, soil, slag, vegetation, and air samples; preparation of environmental remediation-related sampling and analysis plans; process modelling; slag durability studies; and sampling and analysis of incineration offgases for permanent gases, acid gases, metals, and organic compounds.

Characterization of Under Building Contamination at Rocky Flats Environmental Technology Site using Horizontal Directional Drilling and Environmental Measurement while Drilling

Annette Primrose, Kaiser Hill/Rocky Flats Environmental Technology Site; Tom Lindsay, RMRS; David Strand,Arcadia; Lane Butler, Kaiser Hill; and Norma Castaneda, DOE Rocky Flats Field Office

Characterization is required on thirty-one buildings at Rocky Flats with known or suspected under building contamination and will be conducted in parallel with Deactivation and Decommissioning (D&D) activities to meet an aggressive Site closure schedule. The Site has teamed with Sandia National Laboratory (SNL) to use real time monitoring in conjunction with horizontal directional drilling to characterize under building contamination and to evaluate the performance and applicability for future characterization efforts. Data collected using horizontal directional drilling with real time monitoring will be compared to data collected by conventional geoprobe techniques.

The project will investigate two locations, Building 886 and Building 123. Building 886 is currently undergoing D&D activities. Building 123 was demolished in 1998; however, the slab is present with under building process waste lines and utilities.

Field activities will be completed in fiscal year 2000 and will meet the following objectives:

- Characterize the under building contamination at Buildings 123 and 886.
- Implement SNL's real time monitoring system (Environmental Measurement While Drilling) in conjunction with horizontal drilling to determine the effectiveness for characterizing under building contamination.
- Evaluate the feasibility and cost effectiveness of the new characterization methodology compared to conventional characterization.

Annette Primrose is the Project Manager for installation of the ground water reactive barriers at Rocky Flats Environmental Technology Site.

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Session IV

Recycle and Reuse Panel Session

Michael Gresalfi, Oak Ridge National Laboratory

On July 13, 2000, Secretary of Energy Richardson issued a memorandum establishing a suspension on releasing the Department's scrap metals from radiological areas into a "free release" open commerce path. This suspension, and the previous January 2000 Secretarial moratorium on volume contaminated metal releases, has stimulated DOE to develop new internal beneficial reuse and recycling (BR2) strategies, as an alternative path to clean and free release practices. This workshop will present a number of innovative restricted (internal reuse-controlled) recycle and reuse strategies that have been proposed and implemented for both DOE scrap metals and excess equipments. The DOE National Center of Excellence for Metals Recycle, along with the Office of Environmental Management, are presently fostering the institutionalization of these restricted reuse alternatives to free release practices across the complex. In addition, the Ohio Field Office, in conjunction with its pollution prevention and technology deployment activites, has successfully applied a number of BR2 equipment and materials life-extension applications that have proven to be both safe and cost-effective alternatives to the traditonal disposal path for excess scrap metal, concrete, soil, and equipment. These BR2 strategies fully conform to the Secretarial initiatives, and are being conducted by Ohio with the direct support of DOE legal, property management, and project management policies and procedures. In addition, this workshop will explore the reasons for the moratorium and suspension, how they have impacted DOE cleanup activities, and how those activities have been restructured to proceed without recycling radioactively contaminated metals into open commerce.

No abstracts submitted for this session.

Session V

Enhance Performance Through Collaboration Between Pollution Prevention Program and Office of Science and Technology

John Lum, U.S. Department of Energy, Headquarters

The Pollution Prevention (P2) Program and the Office of Science and Technology (OST) share a common mission, to help sites perform their job more cost effectively. During a recent high Return on Investment workshop in Washington, D.C., many of the ROI projects were found to deploy OST technologies. The P2 Program and EM-50 are exploring collaborative efforts to put our resources to better use.

Savannah River and Ohio Operations Offices are conducting a pilot program to assess the benefits of P2/OST collaborations at the site level. The two Operations Offices will examine opportunities where P2 infrastructures can be used to facilitate deployment of OST technologies and where OST expertise and resources can be applied to implement more P2 projects and reduce wastes.

The Office of Science and Technology has requested Richland (RL) to refine the high Return-on-Investment methodology used by the Pollution Prevention Program so it could be used to quantify economic benefits of OST technologies and projects. The DOE management is familiar with the ROI approach and the method is easier to apply. RL will discuss the result of their analysis and provide insight on how the ROI approach could be used in preparing budget documents.

The session will be an interactive panel discussion among Headquarters, OH, SR, and RL representatives. The purposes of the session are to inform the EM community of these two efforts and to solicit inputs from the audience on improvements and opportunities.

No abstracts submitted for this session.

Session VI

SFCA in the 21st Century: Identifying Opportunities for Partnership and Progress

Jim Wright, U.S. Department of Energy, Savannah River Operations Office

The panel session will convene around the central theme of SCFA's future mission and vision for addressing subsurface contamination at DOE sites across the complex. Presentations and a facilitated discussion will focus on the programmatic successes and challenges met by SCFA in recent years and lessons learned. Specific issues to be addressed during the session include: how SCFA and other programs integrate with changing site needs, future challenges, and success in terms of technology deployments, technical assistance, cost savings, risk reductions.

THE Changing Nature of Site Needs

A. Dale Pflug, Argonne National Laboratory, TechCon Program Manager

The TechCon Program was begun in 1992 by the Office of Environmental Restoration to identify commercially available technologies that were applicable to solving DOE remediation problems. In 1998, it was integrated with ITRD under the Subsurface Contaminants Focus Area in the Office of Science and Technology to provide technical assistance for accelerated use of technology. The combination of these two programs with the SCFA Lead Laboratory approach provides comprehensive support to DOE site project teams facing difficult remediation decisions. As more projects approach decision milestones for cleanup, a significant reduction of time available to develop technologies is resulting in increased emphasis on use of existing technology. The shift of more projects into operational stages is resulting in new challenges to solve associated problems. Many of the simple projects have been completed and remaining projects are more complex requiring increased reliance upon resources external to the organization. This presentation will address new tools being used to minimize the impact on having to rely on external resources and discuss the ways that technical assistance mitigates the impact of this requirement.

Dale Pflug has a B.S. in Engineering from the University of Pittsburgh. He has more than 30 years in the environmental field with broad experience in remediation, waste water treatment and technology applications. Mr. Pflug is currently a Senior Program Manager at Argonne National Laboratory

Meeting Future Needs through Technical Assistanc

Tom Hicks, SCFA DOE-Savannah River and Jack Corey, SCFA Lead Laboratory

The Subsurface Contaminants Focus Area is an integrated program chartered to find solutions to DOE's subsurface contaminant problems. Over the last several years, the DOE Sites began to express a need not only for technologies to solve their problems but also for technical assistance in identifying appropriate solutions to the end-user community's concerns. SCFA responded to this need by implementing a Lead Laboratory Concept. The Savannah River Technology Center teamed with the SCFA as the Focus Area's Lead Laboratory. SRTC then partnered with all the National Labs to create a virtual consulting firm within DOE. This Partner Lab arrangement has the entire Complex's pool of outstanding personnel to draw from to provide the necessary assistance to any SCFA DOE customer throughout the Complex. The program is designed to minimize red tape, maximize value and to rapidly and cost effectively disseminate solutions. In order to meet future needs, the program plans to expand the resource base of technical experts to include private sector, other government agencies, and academia. In FY00, 39 technical assistances were provided to the Complex. In FY01, the goal is to provide 60. The presentation will discuss successful examples of technical assistance and planned improvements to further strengthen the program.

Tom Hicks has B.S. and M.S. Degrees in Geology with a minor in Civil Engineering from North Carolina State University and is a registered professional geologist. Mr. Hicks has twenty-nine years of professional experience in the areas of environmental restoration; domestic and foreign nuclear power plant and defense waste processing facility siting. He is the Department of Energy's Technical Team Lead for the Subsurface Contaminants Focus Area.

Science Advancing Solutions into the 21st Century

Mark Gilbertson, U.S. Department of Energy, Savannah River Operations Office and Chet Miller, U.S. Department of Energy, Headquarters

Since its inception in 1996, the Environmental Management Science Program has invested over $224 million in support of 274 research projects, This investment has provided funding for researchers at 90 universities, 13 national laboratories, and 22 other governmental and private laboratories. Over forty percent of the funding in the Environmental Management Science Program has been used to support research to address issues associated with subsurface contamination problems. Significant advances have been made over the last four years in scientific areas such as geochemistry, hydrogeology, geophysics, analytical chemistry, instrumentation, microbial science and plant science. A recent National Research Council report identifies four high priority areas for future research investments: location and characterization of subsurface contaminants and characterization of the subsurface; conceptual modeling; containment and stabilization; and monitoring and validation.

Mark Gilbertson is the Director of the Office of Basic and Applied Research within the Environmental Management Program in the Department of Energy. This Office is charged with implementing the multimillion dollar scientific research program designed to provide the fundamental knowledge necessary in the year 2000 and beyond to correct problems associated with the cleanup of the nuclear weapons production complex.

Identifying Opportunities for Applied Research

Karen Cohen, U.S. Department of Energy, National Energy Technology Laboratory

Since 1992, more than 110 projects have been sponsored by Industry and University Programs to foster private sector companies and universities to solve cleanup problems at DOE sites. A soil probe for in situ metal detection at past disposal sites, is based on laser induced breakdown spectroscopy, produces results in near real-time, and is delivered by cone penetrometer to reduce Investigative Derived Waste. The probe was developed by a small business located in New Mexico, and field-tested at Sandia. A compact treatment cartridge captures and immobilizes radionuclides in aqueous solutions, is constructed of a special membrane with sorbent particles, can be designed for numerous radiological contaminants, and provided cost benefit data that suggests up to 50 per cent savings over conventional methods. The treatment cartridges were developed by a Minnesota company, and field-tested at Savannah River and other sites. To foster the international exchange of cleanup technologies between European countries such as Poland, a Florida university has spearheaded international studies that include bioremediation of petroleum-contaminated soil, phytoremediation of metals in soil, and others. These are only a few of many special partnerships with the private sector and universities that have reaped significant benefits for DOE's cleanup effort, and will continue to provide solutions for the future. Future partnering opportunities exist in those areas where solutions are still needed or the problems are yet to be defined, and are likely to include: characterization; access and delivery in difficult conditions; optimizing in situ treatment; validation and verification; and long-term stewardship.

Karen Cohen is Project Manager at National Energy Technology Laboratory. She has 15 years of service at the Departments of Energy and Interior as researcher and manager in numerous research programs. During this time, Dr. Cohen has applied innovative technologies to diverse problems in environmental, petroleum, and mining areas. She received a Ph.D. from the Univ. of Pittsburgh, has held faculty positions in the New York and Pennsylvania University Systems for over 10 years, and is a licensed professional geologist.

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Session VII

ASTD: Building Partnerships for Success Panel Session

Kurt Gerdes, U.S. Department of Energy, Headquarters

The Accelerated Site Technology Deployment (ASTD) program has been developed to help reduce the financial risk that the field organization must accept in deploying new technologies. Abstracts are sought for sites that have used the ASTD program.

Fernald's Experience Deploying In-Situ Gamma Spectrometry to Delineate Radionuclide-Contaminated Soils During Remediation

Robert Janke, DOE-FEMP; R. Danahy; J. White; and J. D. Chiou, Fluor Fernald; M. J. Davis; R. Johnson; and K.C Picel, Argonne National Laboratory; K. Miller, U.S. Department of Energy, Environmental Measurements Laboratory; and M. Carpenter, Idaho National Engineering and Environmental Laboratory

The Fernald Environmental Management Project carried out an Accelerated Site Technology Deployment (ASTD) project during FY 1998-2000 that successfully utilized in-situ gamma spectrometry to delineate soils contaminated with U-238, Th-232, and Ra-226 on a near real-time basis during remediation. The technology has become an integral part of the site's daily soil characterization efforts and has allowed Fernald to achieve a stringent schedule for remediation. Its use has yielded considerable cost savings and also has provided results superior to those that would have been obtained by conventional methods.

Important lessons have been learned in a number of areas during Fernald's implementation of the ASTD soils project. These areas include the acceptance and understanding of new characterization technology by regulatory agencies, the major opportunities for cost savings associated with in-situ characterization, the integration of real-time characterization technology with a large excavation program, and the need to address various technical issues associated with the application of the technology.

Fernald will continue to refine and deploy in-situ characterization methods during soil remediation. Application of in-situ methods in locations for which deep excavation is required and utilization of the methods to enhance waste minimization are areas that need additional efforts at Fernald. The achievement of broader and more complete regulatory acceptance of the methods and their wider deployment are areas that also require additional efforts outside Fernald.

This paper will review the major successes of the ASTD soils project at Fernald, discuss the major lessons learned, and outline the path forward.

Robert Janke has earned his B.S. in Chemistry and M.S. in Health Physics. He has worked with the Department of Energy at Fernald for nearly 10 years and currently serves as the Soils, On-Site Disposal Facility and Groundwater Team Leader.

Deployment of In Situ Measurement Techniques and the MARSSIM Process for Characterization of the Brookhaven Graphite Research Reactor

Paul Kalb, Brookhaven National Laboratory; Larry Luckett, URS, Inc.; Carl Gogolak, DOE Environmental Measurements Laboratory; and Larry Milian, Brookhaven National Laboratory

This paper describes a DOE Accelerated Site Technology Deployment (ASTD) project being conducted at Brookhaven National Laboratory to characterize the Brookhaven Graphite Research Reactor (BGRR) facility, which is currently undergoing decontamination and decommissioning (D&D). The MARSSIM process is being implemented to provide guidance for optimized survey planning and data evaluation during the characterization phase. Innovative in situ analytical techniques are being deployed to quantify the type and extent of radiological contamination including ISOCS (Canberra Industries, Inc.) for gamma emitting radionuclides and BetaScint (BetaScint, Inc.) for Sr-90. These techniques provide a number of advantages compared with conventional characterization methods including:

- near real-time data (resulting in acceleration of project schedules),
- fewer samples required (resulting in lower analytical costs),
- ability to evaluate inhomogeneous materials (resulting in improved quality assurance),
- lower radiation dose exposure to personnel.

Data has successfully been acquired and evaluated for several BGRR facilities and components including the Pile Fan Sump (PFS), underground piping for the PFS, parking lot areas, Above Ground Ducts, contaminated cooling fans, and the graphite reactor pile. Cs-137 is the predominant gamma-emitting radionuclide identified, with smaller quantities of Co-60, Am-241, and Sr-90 detected.

The BNL ASTD project has achieved success in that several innovative technologies have been proven effective and have been adopted in the project baseline for future use. The BGRR Decommissioning Project has agreed to continue funding in FY 01 and beyond. In addition to the initial secondary deployment site (Canyon Disposition Initiative at Hanford), BNL is currently talking with other sites (e.g., Nevada Test Site) about potential deployments for D&D characterization.

Paul Kalb is a Senior Research Engineer at Brookhaven National Laboratory. He has a bachelor's degree in mechanical engineering from the State University of NY at Binghamton and a master's degree in nuclear engineering from Polytechnic Institute of NY. Paul has been employed at BNL for20 years and has concentrated his efforts in the areas of hazardous/radioactive waste management, environmental restoration, and health and safety aspects of emerging energy technologies. Current responsibilities include Group Leader and Principal Investigator for programs on D&D and waste form development for DOE and industry. He has served as a member of several national technical support groups on Final Waste Forms for DOE and EPA, recently currently chaired a team that wrote a WASTECH volume on Stabilization/Solidification, is a member of the Program Advisory Committee for Waste Management Symposia, Inc., and has numerous patents and publications in the area of waste treatment and encapsulation.

Remediation of Plume Source Areas at Lawrence Livermore National Laboratory by Electroosmosis

Walt W. McNab, Jr.; Steve Hunter; Tristan Pico; and Roberto Ruiz, Lawrence Livermore National Laboratory

Ground water contaminant plumes in heterogeneous porous media are difficult to completely remediate with pump-and-treat because finer-grained materials such as clays and silts do not allow the effective transport of contaminants by advection driven by achievable hydraulic gradients. Where fine-grained materials harbor high concentrations of contaminants or Nuclear Aquous Phase Liquids, such as in contaminant release areas, this issue is particularly significant since such materials will act as diffusion-limited source terms. Electroosmosis (EO), a process entailing the movement of pore water under the influence of an electric field, provides a means to significantly speed the removal of contaminants from fine-grained sediments. This movement is a result of the attraction of the diffusive double layer (the cloud of water molecules and positively-charged ions that forms over the negatively-charged clay mineral surfaces) to the negatively charged electrode (i.e., cathode), with viscous drag pulling the remaining pore water in the same direction. Lawrence Livermore National Laboratory (LLNL) has been investigating EO as a remediation technology for fine-grained plume source areas at the LLNL Main Site. The goals of the project include demonstrating the efficacy of EO in transporting contaminated ground water in fine-grained sediments and optimizing the operation of the EO system for greatest process efficiency.

Work performed under the auspices of the U.S. Department of Energy by Lawrence Livermore National Laboratory under Contract W-7405-Eng-48.

Walt W. McNab, Jr., Ph.D. is an environmental scientist at Lawrence Livermore National Laboratory. Dr. McNab holds a B.A. in geology and an M.S. and Ph.D. in hydrogeology from U.C. Berkeley. His research interests include reactive transport modeling, aquifer geochemistry, the use of statistical tools for studying contaminant plume behavior, and ground water treatment technology development.

Characterization Alternatives for the Old Cave at the DOE Miamisburg Environmental Management Project

Michael A. Krstich; Doug Maynor; Don Krause; and Dale Pflug, EMS - TechCon

An immediate and vital need for advanced characterization through concrete walls and floors has recently been identified in a removal project known as the Old Cave at the Department of Energy (DOE) Miamisburg Environmental Management Project (MEMP). The Old Cave is actually the entombed remains of a 1950's hot cell, which must be removed. A Value Engineering (VE) Study in January 2000, sponsored by the D & D Focus Area, recommended immediate characterization of the entombed contents; both radiological and physical, in order to properly categorize the actual threat the Old Cave presents.

Accelerated Site Technology Deployment (ASTD) funds are being used to secure expert technical support, choose the best technologies from the best vendors, and deploy those innovative technologies that have been successfully used elsewhere. The project team has enlisted technical assistance from the TechCon program to identify the experienced commercial vendors with innovative characterization technologies.

Proper selection and application of the best tools to non-intrusively and then intrusively verify the radiological and physical conditions inside and under the concrete entombment is essential to achieve a return of investment for the ASTD funding. The approach by DOE Ohio is that effective technologies will be deployed at multiple OH Closure Sites, since all are known to have contaminants and buried objects under concrete and in the underground lines.

Michael Krstich is President of EMS. Dale Pflug is program manager for the TechCon program at ANL. Mike Kelly is a project manager for the ITRD program. Janice Hensley is a project manager for Bechtel- Jacobs at Oak Ridge. Tony Manion is project manager for DOE at Oak Ridge.

Operation of an In-Well Air Stripping System at BNL

Vincent Racaniello, Brookhaven National Laboratory

Brookhaven National Laboratory's Environmental Restoration Division successfully implemented an Accelerated Site Technology Deployment (ASTD) project during FY 1998 and FY 1999. This project utilized in-well air stripping technology to address a groundwater plume of volatile organic compounds which has migrated beyond the BNL site boundaries. The depth of the plume varies from 120 to 240 feet below land surface in this area. This project was the first off-site groundwater cleanup system installed at BNL. The system was completed in July 1999 and began full scale operations in September 1999. The system utilized a unique design which incorporated several innovative features including a closed loop air treatment system, a centrally located control system in conjunction with in-well air stripping technology. These features have helped make this a technological success while addressing community and the property owners concerns about the location of this system. The system has operated effectively since full scale operations began in September 1999. There have been several obstacles which were overcome during the initial operations of this system. These included difficulties with regulating the air flows and water flows to the individual wells, defective carbon vessels and several problems with the control system. BNL is planning to deploy this technology at five other off-site locations. This discussion will focus on some of the lessons learned and successes encountered during the first year of operation of this system. Performance and cost data will be presented for this period of operation. BNL will continue to apply the information and lessons learned from this project to other deployments at the site.

Vincent Racaniello is a Project Manager at Brookhaven National Laboratory. He earned a Bachelors degree in Water Resources from SUNY @ Oneonta. He has ten years experience in soil and groundwater investigation and remediation. He has worked at Brookhaven National Laboratory for the past four years with his main focus on developing and implementing groundwater cleanup of volatile organic compounds.

Effective Pollution Prevention at SRS through Purge Water Management and Aqueous Waste Minimization

Cary Tuckfield, Westinghouse Savannah River Company

Two mutually supportive technologies have been developed to reduce wastes and lower long-term monitoring costs at the Savannah River Site.

The Purge Water Management System (PWMS) is a closed loop non-contact system used to return purge water to the original aquifer without significantly altering ground water quality.

Purge water is pumped from the well and temporarily store inside a bladder tank, which prevents contact with the outside environment while the protocol sample is collected. Once the sample has been collected the purge water is then returned to the aquifer. This effective technology reduces the collection transportation and treatment of investigation-derived waste across the site. The only waste stream is the sample itself.

Further improvements have been accomplished by reducing the well volume with the installation of a well packer in the well just above the screened zone. This design modification has significantly reduced the purge volume required for water quality stabilization prior to sampling the well. In conjunction with the packer a small amount of tracer will be injected into purge water before returning the unused purge water to the well. This method will be considered where low flows are known to exist. This latter modification of the technology is in testing via a permit from the South Carolina state regulators.

Several PWMS units have been successfully installed at both the Savannah River Site and the main site of the Lawrence Livermore National Laboratory. These successes are part of a Accelerated Site Technology Demonstration (ASTD) project funded by a headquarters initiative from the US Department of Energy.

The Aqueous Waste Software Application (AWSA) accesses a relational database of groundwater contamination measurements, retrieves user-specified historical data on individual wells or sets of wells, and applies a statistical algorithm. The outcome is a list of monitoring wells which require containerization of investigation derived waste (i.e. purge water). This application is available from any network computer with X-windows capabilities and recently has been web-enabled via the SRS intranet. AWSA has a graphical user interface that allows multiple users to quickly and reliably produce containerization lists with accurate summary statistics for each well. AWSA is a waste-minimization and cost effective tool. It minimizes the number of containerized groundwater monitoring wells and the associated costs therefore of treating the containerized groundwater. AWSA further supplies a report that identifies the wells that are candidates for the deployment of PWMS technology described above.

No Bio Submitted.

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Session VIII

Cost Engineering Session

Bryan Skokan, U.S. Department of Energy, Headquarters

EM needs to collect and share technology cost information to better understand cost parameters and for improved estimates in the future. Also, what software, tools, techniques, or cost data are available for developing estimates for environmental projects and technologies? Abstracts are requested on various cost collection and estimating systems that can be used by other sites and organizations.

No abstracts submitted for this session.

Session IX

Vadose Zone Panel Session

Skip Chamberlain, U.S. Department of Energy, Headquarters

Contamination in the vadose zone can act as a source for ground water contamination or as a direct exposure pathway. Discussion will revolve around innovative vadose zone modeling, characterization, remediation, and monitoring technologies.

The DOE Complex-Wide Vadose Zone Science and Technology Roadmap

Daniel B. Stephens, Daniel B. Stephens and Associates; Stephen J. Kowall, INEEL; David Borns, Sandia National Laboratory; Darwin Ellis, Schlumberger; Carl Enfield, U.S. Environmental Protection Agency; Lorne Everett, ARCADIS Geraghty & Miller; Martinus T. Van Genuchten, U.S. Department of Agriculture; Frank Parker, Vanderbilt University; Cathy Vogel, DoD SERDP/ESTCP; Edwin Weeks, U.S. Geological Survey; and John Wilson, New Mexico Institute of Mining and Technology

The Idaho National Engineering and Environmental Laboratory (INEEL) was charged by the DOE Environmental Management Office to develop a complex-wide science and technology roadmap for the characterization, modeling, and simulation of the fate and transport of contamination in the vadose zone.

It is a formidable task to characterize and model such contamination and sites and quantify the fate and transport of those contaminants in complex hydrogeologic systems. Increasing our understanding of vadose zone contaminant fate and transport through better science, characterization, modeling, and correct technology application is critical for the continued operation and cleanup, and, final disposition of DOE facilities.

The DOE Complex-Wide Vadose Zone Science and Technology Roadmap is an important step in rationalizing the Science Program necessary to develop and coordinate long-term interdisciplinary research into the processes that affect fluid movement, contaminant transport and chemical transformation processes in the vadose zone.

During two Workshops in fiscal year 2000, Work Groups identified means of accomplishing advances in vadose zone science in an integrated framework. This presentation and the asociated Poster Sessions will present the draft roadmap results developed to provide a framework to establish a research strategy to close or eliminate gaps in our scientific understanding critical to making key environmetal, remediation, and stewardship decision.

Daniel B. Stephens is a world-renowned expert in vadose zone hydrology, seepage through unsaturated materials, numerical modeling and vadose zone monitoring. In addition to writing a book on the subject for CRC Press, he has authored chapters in three books on the subject for UNESCO, the American Society for Testing and Materials (ASTM) and the Soil Science Society of America (SSSA). Dr. Stephens also served on the Elicitation Panel on Vadose Zone Hydrology, Yucca Mountain, Nevada. He was a Professor of Hydrology before establishing his own firm. Dr. Stephens is a Certified Professional Hydrologist, a Registered Geologist in three states, and has 30 years of professional experience. He has also given expert witness testimony.

Vadose Zone Science and Technology Solutions: "The Book"

Brian B. Looney and T.J. French Sr., Savannah River Technology Center; R. W. Falta, Clemson University

Vadose Zone Science and Technology Solutions is a comprehensive reference on the conditions in, and characteristics of, vadose zone systems. The book, sponsored by the DOE Office of Science and Technology and available from Battelle Press, is the result of three national workshops. It represents the efforts and contributions of scientists and engineers from federal agencies, industry, and universities. The book provides an overview of vadose zone processes and complexities as well as detailed and specific mathematical, geological, and biochemical information. It addresses issues related to practical engineering, policy, and program management. A unique feature of the book is the use of short case studies to illustrate scientific concepts and potential problems – we included both "successes" and "failures". In the process, we identified a set of eight scientific challenges and data gaps. These are highlighted to stimulate future scientific progress and support current activities such as the Hanford Groundwater-Vadose Zone Integration Project and the DOE Complex-Wide Vadose Zone Roadmap.

Dr. Brian B. Looney is a senior fellow research engineer at the Department of Energy Savannah River Technology Center in Aiken SC. In this position for the past 17 years, Dr. Looney has coordinated development and deployment of environmental characterization and clean-up methods. He holds six U.S. patents and one foreign patent for environmental technologies and is coeditor of a recent book on vadose zone science.

Innovative Vadose Zone Modeling Software Development at the Savannah River Site

Gregory G. Rucker, Site Geotechnical Services, Projects, Engineering and Construction Department, Savannah River Site

The Vadose Zone Contaminant Migration Multi-Layered Software (VZCOMML) is an innovative software developed at the Savannah River Site that automatically performs vadose zone fate and transport analyses.

The software's power is in its capability of calculating less restrictive, but still protective clean-up levels for waste units. This can equate to the development of realistic clean-up levels reducing overly conservative remediation goals, resulting in significant savings for the ER program. Therefore, the number of chemicals that must be retained for a more labor and cost intensive analysis is significantly reduced or eliminated altogether.

The software was designed within a simplified framework to minimize data parameter input and the need for expensive geotechnical data while optimizing useful result output. Significant cost-savings are realized by the software's simultaneous calculation method and optimizing the number of chemicals per run when compared to other commercial software available on the market. The combination of the screening method and use of verified and accepted equations adds value by generating simple but powerful information for remedial project decisions.

This software is copyrighted by Westinghouse Savannah River Company and is currently available at no cost to any government agency or its contractors. The software has won an Intellectual Property Award and will soon be distributed on a commercial basis. It was also featured in "Pollution Engineering" magazine.

Gregory G. Rucker has a B.S. in Environmental Science and a M.S. in Environmental Engineering. He has a Principal Environmental Engineer for WSRC. Mr. Rucker has over 27 years experience in environmental regulatory and consulting positions including management, senior technical positions and academia.

Evaluation of the Savannah River Site Vadose Zone Monitoring System Program

Heather Holmes-Burns, BNFL-Savannah River Company

A Vadose Zone Monitoring System (VZMS) was deployed in early 1999 to provide data and information about possible downward flux of water and contaminants emanating from the E-Area Disposal Facility trench area at the Savannah River Site (SRS). The system will monitor the areas beneath and around the shallow disposal trenches to validate the performance assessment (PA) and to assess impact of the disposal unit on the Drinking Water Standards. To verify compliance with the PA, the VZMS consists of monitoring sensors installed in clusters at four depths in each of three boreholes. In addition, there are three access wells for neutron probe monitoring that provide water content information and four angled wells underneath the centerline of the trench that provide soil water samples for contaminant concentration. This report will 1) evaluate the behavior of the monitoring sensors used to support the existing VZMS, and 2) calculate estimates of water flux and contaminant flux.

The report will also discuss the second phase VZMS that was deployed in 2000 for both existing disposal trenches and planned disposal trenches. The phase II monitoring system has an improved design based on the lessons learned from the 1999 deployment. The enhanced features of the FY00 design include: a) redundant monitoring of soil parameters, b) long-term monitoring strategies, and c) pre-operational monitoring to obtain baseline data. The design is also based on two-dimensional steady state modeling that determined spatial arrangement of the vadose zone wells. A new technology known as the "Vapor Well - Cold Wringer Tritium Gas Sampling System" was deployed this year. This technology involves the collection of soil-gas from discrete vadose zone points followed by condensation, collection, and analysis of condensed water from the soil- gas sample. This soil-gas sample is saturated with water containing tritium concentrations that are representative of soil-water tritium concentrations due to diffusive processes. This technology offers advantages over the baseline by enabling a "larger zone of influence" to be accessed.

Heather Holmes-Burns has served over 17 years with SRS in various technical roles including low-level radioactive waste management, mixed waste research and development, incineration, and waste stabilization. She served as the project manager for installing the first vadose zone monitoring system at the Savannah River Site. Ms. Holmes-Burns is currently managing the second phase installation of a vadose zone monitoring system in the LLW disposal area at SRS.

Cost-Effective Method of Determining Shallow Radionuclide Activities

John April; K. Bergstrom; T. Mitchell; R. Randall; R. Price; D. DuVon; and S. Petersen, Bechtel Hanford, Inc.

This presentation describes a small-diameter geophysical logging system which affords cost-effective subsurface access and evaluation of radionuclide activities. This system has been developed and deployed at the Hanford site, but could be used to characterize any area that has unconsolidated sediments.

The small-diameter geophysical logging system uses a Geoprobe® to push 44.5 to 57.2 mm (1.75- to 2.25-in.) outside diameter rods to a depth of up to 10 m. A passive gamma-ray scintillation detector is lowered down the inside of the rods and spectral gamma data are collected at regular intervals. At counting times of 200 seconds, the detection limit for 137Cs is approximately 4 pCi/g.

After development, this system was deployed at a waste site that had been identified as pervasively contaminated. Through spectral analysis of the data it was determined that the very near surface area had abnormally high concentrations of naturally occurring potassium, uranium, and thorium, but contained minimal or undetectable activities of man-made radionuclides. Thoroughly characterizing the waste site with this system resulted in decreasing the estimated volume of contamination by nearly 150,000 m3. This work was performed at a significantly lower cost than conventional near-surface characterization techniques (e.g., test pits, boring technologies).

John April has twenty years experience in geotechnical engineering consulting, naval nuclear program, Indian water rights, and environmental restoration. For the past nine years he has specialized in setting up large-scale remedial action projects and technology demonstrations and deployments. Mr. April is now working for the Remedial Action Waste Disposal Project at Hanford managing design, assessment, technology and waste minimization.

Fissures in Yucca Dry Lake Bed, Nevada Test Site, U.S.A.

Donald C. Helm, Morgan State University

Fissures are observed to occur at land surface throughout the American southwest, whose climate is arid to semi-arid. They typically start as cracks at depth, which migrate upwards, and intercept the land surface as a final step. Subsequent rainstorms wash sand grains into the crack, which begins an erosional stage of fissure (gully) development. The original crack is usually less than a centimeter wide, can be hundreds of meters deep and thousands of meters long. The subsequent erosional filling in of the crack with sand eventually leaves a surface fissure with a width and depth of roughly one to three meters.

One location where the process has been investigated is Yucca Playa (dry lakebed) in Nevada. Four major cracks occur in Yucca Playa. Each is parallel to its neighbor (about 500 meters away), lies orthogonal to the direction of ground water flow, is about two kilometers long, and with time two have extended off the dry lake bed onto the adjacent valley slope. Their location is not associated with a subsidence bowl.

More is at stake here than simply giving a successful description of a sequence of events at a chosen locale. The physical mechanism that generates such a crack in the first place is probably not limited to arid regions. Such a crack itself characteristically migrates upward from the water table. The Yucca Flat cracks were measured by the U.S. Geological Survey to extend from the water table at a depth of 400 meters. Horizontal tensile strain within the underlying aquifer is a probable cause for crack initiation along the base of the vadose zone.

Climate dictates whether the base of the vadose zone simply stretches laterally with the underlying aquifer or whether it is brittle enough to initiate a crack. By way of contrast, one would expect in a humid climate that a shallow vadose zone would simply stretch laterally all the way to the land surface. This process would enhance the porosity along a vertical plane or zone and similarly attract preferential vertical flow through the laterally stretched vadose zone during subsequent rainstorms. Not seeing a discrete crack at the land surface in humid regions does not imply lateral stretching of pore spaces does not occur.

The fissures in Yucca dry lakebed illustrate some of the effects of aquifer deformation. For example, aquifer deformation introduces transient material heterogeneities within the overlying material. Transient heterogeneities in turn tend to control ground water flow from the land surface through the vadose zone.

Dr. Donald Helm is Professor of Civil Engineering and occupies the DOE-EM Dr. Samuel P. Massie Chair of Excellence in Environmental Disciplines at Morgan State University (MSU). Dr. Helm is recognized internationally as the foremost authority in his field. His computer code COMPAC is used on five continents and remains the standard against which the results of more recent, but less precise, codes are compared. Currently, Helm is serving as advisor to a doctoral student at the Royal Melbourne Institute of Technology in Australia, whose dissertation topic has been to introduce Helm's new theory of poroviscosity to the computer code COMPAC. His research through the years has been supported from a large mix of both private companies and government agencies.

Development and Implementation of a High Rate Logging System at Hanford Tank Farms

R.G. McCain, J. Berwick, C.J. Koizumi, and J.F. Bertsch, Grand Junction Office

Since 1995, the DOE Grand Junction Office (GJO) has been using a high-resolution spectral gamma logging system (SGLS) to complete a baseline characterization of gamma-emitting contaminants in the vadose zone in the vicinity of the Hanford single shell tanks, using existing monitoring boreholes. The SGLS uses a cryogenically cooled HPGe detector which can detect gamma-emitting radionuclides such as 137Cs at levels as low as 0.1 pCi/g. During logging operations, many intervals were encountered in which the gamma flux was so high that the SGLS became "saturated" with system dead times approaching 100% and no usable spectra were obtained because of pulse pileup and elevated background. Within these intervals, concentrations were found to exceed several thousand pCi/g. In order to investigate contamination levels within these intervals, DOE-GJO designed and deployed a high rate logging system (HRLS). The HRLS presented a number of unique challenges. For example, the detector had to utilize readily available technology, function with the existing logging system, and calibration had to be performed using standards intended for environmental measurements. Shields were provided to extend the upper range of the detector, and corrections had to be derived for shielding, as well as for dead time and casing. The detector was deployed in 1999 and used to collect data in intervals where the SGLS had been saturated. Radionculide concentrations as high as 108 pCi/g were successfully measured. Recently, the HRLS was deployed in a slant borehole under Tank SX-108, in which a number of samples were collected. A high degree of correlation between laboratory data and HRLS data was observed. This presentation will describe the development and deployment of the HRLS, illustrating how capabilities and expertise developed for the National Uranium Resource Evaluation (NURE) Program were successfully applied to the problem of radioactive waste investigation.

Rick McCain is the Senior Technical Lead for the Hanford Tank Farms Vadose Zone Baseline Characterization Project. This work is being performed by MACTEC-ERS for the DOE Office of River Protection, under direction of the DOE Grand Junction Office. Mr. McCain has more than 20 years experience in site investigation and characterization.

Session X

Project Management/Value Engineering Panel Session

Tom Tregor, U.S. Department of Energy, Savannah River

DOE project management direction developed over the last few years has changed the way many DOE sites manage their projects. Abstracts are being solicited that illustrate how site project management conforms to programs such as ISM (Integrated Safety Management), IPABS (Integrated Planning, Accounting, and Budgeting System), value engineering, DOE Order 435.1, and LCAM (Life Cycle Asset Management), including site-wide integration across ER and WM programs.

Critical to Systematic Stewardship Project Management

Richard Woodward, Lawrence Livermore National Laboratory

The Lawrence Livermore National Laboratory's Phoenix system was created in the Environmental Restoration (ER) Division to assist in the development of baselines, maintaining historic records, tracking current year execution, and serving as a useful performance management tool for project managers. Recently, ER Stewardship requirements were fully addressed when Phoenix, coupled with geo-technical and engineering data, produced comprehensive and defendable budget projections. Because Phoenix is a data base system and cost estimates are easily modified to reflect new information, the uncertainty in ER Stewardship budget projections can be understood and managed. Phoenix cost data are derived from historical cost or are based on best commercial and management practices. The cost, scope, and schedule for each project is established by the individual LLNL project managers, validated by DOE Oakland cost estimators and project managers, and ultimately used to address numerous questions and HQ requests. The Phoenix System is an Activity Based Costing Model that captures a work breakdown structure (WBS) cross-walked to the Engineering Cost Element Structure (ECES). Phoenix coupled with geo-technical and engineering data such as cleanup times and O&M costs, was used to calculate defendable life-cycle cost scenarios and to examine cost benefit over time to cleanup. Phoenix is an interactive database that is not site specific and can be used on multiple computer platforms.

Work performed under the auspices of the U.S. Department of Energy by Lawrence Livermore National Laboratory under Contract W-7405-Eng-48.

Dr. Woodward has Ph.D. and MS Civil Engineer degrees from UC Berkeley and a BCE from the University of Santa Clara. He is responsible for project planning in the Environmental Restoration Division at LLNL and for development of Multi-Year Work Plans, the Baseline Plan and the Long Term Stewardship Plan. Prior to joining LLNL Dr. Woodward was a Geotechnical and Environmental Engineering consultant for over 30 years responsible for major geotechnical engineering aspects of large dams, bridges, nuclear power plants and buildings, and for assesment, design, construction and remediation of contaminated soil and ground water projects throughout the US. He has focused on application of practical decision tools to environmental restoration.

Experiences and Strategies for using DOE Technical Assistance Resources

Dale Pflug, Argonne National Laboratory; Jack Corey, Savannah River Technology Center; and Dr. Malcolm Siegel, Sandia National Laboratory

Technical assistance has played an increasingly important role with project teams. The TechCon program was established in 1992 to support location and understanding of commercial environmental technology alternatives. The ITRD program was established in 1993 to evaluate technology alternatives and conduct demonstrations to obtain required performance data for subsequent deployment decisions. The Lead Laboratory Technical Assistance program was established in 1999 to provide a rapid response to projects specific requests for best available technical expertise from across the DOE National Laboratory system. These three technical assistance resources have provided an integrated approach to technical assistance requests in fiscal year 2000.

This presentation will examine technical assistance responses provided to projects at the Oak Ridge, Paducah, and Pantex sites and describe the complimentary roles provided by each of the initiatives. The expected outcome is to provide better understanding of the use of DOE technical assistance programs to mitigate obstacles to project management decisions and to enhance opportunities for project performance enhancement.

Dale Pflug, with Argonne National Laborator, is program manager for the TechCon program. Jack Core, with the Savannah River Technology Center, is project coordinator for the Lead Laboratory Technical Assistance progarm. Malcolm Siegel, with Sandia National Laboratory, is technical coordinator for the ITRD program.

Guaranteed Remediation: An Innovative Approach to Environmental Cleanup and Site Closure

Mark Nickelson, Advanced Infrastructure Management Technologies (AIMTech), Lockheed Martin Energy Systems, Inc.

Guaranteed remediation is a comprehensive, innovative approach to environmental cleanup that guarantees-at a fixed price-regulatory site closure and facilitates the U.S. Department of Energy's technology transfer mission. Using a combination of environmental management insurance, financial guarantees, and advanced technologies, cleanup costs can be reduced by as much 50%. The fixed-price contract, which covers known and unknown contamination, transfers cost and performance to the subcontractor.

To begin, candidate sites are evaluated for their applicability of the guaranteed cleanup approach. After site selection, the cleanup approach and cost estimates are agreed upon. The guaranteed fixed-price amount is deposited into an interest-earning escrow account. Payments are then made to the subcontractor upon achieving performance milestones. Final payment is made when regulatory closure is achieved. A modified form of cost-cap insurance, which provides insureds with a backup financial guarantee and third-party liability protection, backs the subcontractor.

Guaranteed remediation has been successfully applied in the private sector and is now being tested on government sites. AIMTech is currently conducting a pilot program at three U.S. Army Training and Doctrine Command installations: Fort Leonard Wood, Missouri; Fort Gordon, Georgia; and Fort Rucker, Alabama.

Mark Nickelson is the Deputy Director of Advanced Infrastructure Management Technologies (AIMTech) responsible for the administration of all program areas and the full suite of environmental/infrastructure services within AIMTech, including investigations, remediation, technology deployment, and technical support (engineering, geology, hydrogeology, geophysics, risk assessment, cost estimating, scheduling, and regulatory compliance). In all, Mr. Nickelson has more than 20 years of experience in environmental characterization and remediation, having held positions in both technical areas and project management. He received a B.S. in geology from Shippensburg University and an M.S. in geology from Indiana University. In addition, Mr. Nickelson is currently on several federal working groups or panels involved in the identification and evaluation of new, alternative, emerging or innovative technologies that could be applicable to federal facilities.

Combining Technology and P2 for Cost Savings at Multiple Sites

Richard Govers, Chamberlain Group and Doug Maynor, DOE OH

DOE has supported site Project Management by developing solutions to common technical needs across projects and between sites. These efforts have obtained varied degrees of success.

On a smaller scale, DOE OH and its five sites have achieved initial success by working together to save money to meet their budget limitations as closure sites. A team of technology, P2WMin and waste managers from Ohio and the five sites are sharing their experiences and resources and are working together on common cost savings initiatives.

This team uses evaluation tools of Value Engineering and Life Cycle Analysis to weigh possible solutions.

This effort began in November 1998. In 1999 the first initiative was deployment of a concrete crushing unit to be shared between the sites, using common permitting and similar procedures, sharing crew experience and conducting campaigns at each site on an as-needed basis.

This presentation describes our common site initiatives in 2000:

- Contaminated equipment re-use by commercial companies and other DOE sites
- Electronics recycling
- Evaluation of PBC treatment and disposal alternatives

Richard Govers has been working with Doug Maynor on Ohio-wide Cost Savings Initiatives since 1998 and is an owner of The Chamberlain Group, Ltd., providing nuclear project management and engineering services.

Uranium Management Group Activities

J. Dale Jackson, Office of Uranium and Engineering Services

The Uranium Management Group (UMG) was established within the Department's Oak Ridge Operations Office to coordinate the functions necessary to safely and effectively manage the large quantities of uranium that are now excess to national security needs. Coordination of common uranium management functions will provide the following benefits: an experienced staff with knowledge of uranium materials; consolidated management of uranium; improved security; technical support to all holding sites; a single point of contact for issues identification and resolution; reduction of operating costs; accelerated site closure; more complete uranium inventory information; better coordination with external agencies; coordination of crosscutting functions such as packaging and transportation; reduction of technical risk; and a central source of information for the public. Excess quantities of uranium exist at over a hundred sites within the United States, including many universities. Although much of this material will be dispositioned as waste, approximately 35,000 metric tons of uranium (MTU) may be reusable. Potential uses include fuel for research and commercial nuclear reactors as well as military ordnance such as armor and penetrators.

The UMG is presently transferring and storing reusable excess uranium materials at a designated interim facility located at the Department's Portsmouth Site in Ohio. Approximately 2500 MTU of LEU, NU, and DU have already been transferred to the Portsmouth Site. These materials have been shipped from the Fernald Environmental Management Project in Ohio, Seattle University, the University of Nebraska and Cornell University. Additional shipments are anticipated this year from the Department's Hanford Site. UMG activities are always conducted in full compliance with the National Environmental Policy Act. Environmental Assessments have been prepared for the Fernald and Hanford shipments and an Environmental Impact Statement for consolidation of the Department's reusable LEU, NU, and DU is now underway.

J. Dale Jackson is currently the Director of the Uranium Management Division (UMD) for DOE's Oak Ridge Operations. He has a BS in Mechanical Engineering from the University of Tennessee and over twenty-four (24) years experience in government and commercial nuclear power. Mr. Jackson's primary responsibility as UMD Director is the development of a DOE Uranium Management Group. Mr. Jackson is married, has four (4) children and resides in Andersonville, Tennessee.

Cost Savings through Software Development for Release Site and Facility Management

Loretta M. Visconti and Kris Andersen, RCS Corporation

Over the course of five years a database has been developed to manage Oak Ridge Reservation (ORR) release sites and facilities for reporting and tracking of performance metrics to Congress, the DOE HQ and regulatory agencies. The database stores the list of units with a cross reference of each to associated HSWA SWMU's, CERCLA FFA contaminated sites and contractual areas of responsibility. Forty-two data elements are managed for each unit. These data elements include location, regulatory status, documentation history, forecast completions data , and contaminates of concern, to name a few.

The database is a client-server system consisting of a SQL Server database with client applications for viewing and editing data, respectively. The server operating system is Windows NT Version 4.0 and can be accessed anywhere in the ORR internal network and from the Internet by an IP address. The software application is written with Microsoft's Visual FoxPro and makes generous use of icons, picklists, and dialog boxes.

Data are stored in a Microsoft SQL Server Version 6.5 database. User groups have been established for accessing the data to maintain configuration control. There are diverse users at the ORR such as various contractors and areas of responsibility. The system user groups include View only access, Release site edit access, SWMU edit access and edit all access.

Over the first two years during development a savings of 75% in the budget was recognized while work load increased.

Loretta Visconti works as a Senior geologist for RCS Corporation. She has been an Environmental manager with 20 years experience in the environmental field and 6 years managing systems development. Loretta has a BS degree in Chemistry and certificate in Environmental Studies from the University of Florida.

Achieving Cost-Effective Cleanup Using "Green" Environmental Restoration Technologies

John P. Ziagos and Rolf U. Halden, Lawrence Livermore National Laboratory

Site 300, established in 1955, is a remote experimental test facility located in the rugged Altamont Hills east of Livermore, California. Located 30 miles southeast of San Francisco, Site 300 is owned by the Department of Energy (DOE) and operated by the University of California as Lawrence Livermore Natural Laboratory. Past defense program practices, including high explosives testing, have resulted in releases of contaminants to the soil and subsurface. Contaminants of concern include volatile organic compounds, radionuclides, nitrates, metals, perchlorate, high explosives compounds, and fuel hydrocarbons. A team of state and federal regulators, DOE, and LLNL representatives, guided by a Federal Facilities Agreement signed in 1992, manages all Superfund activities. A ten-year schedule was recently negotiated with the regulators; however, subsequent flat DOE budget allocations has demanded more efficient and cost-effective remediation technology options. "Green" environmental restoration technologies have been proposed to meet this need. "Green" technologies are those that satisfy several of the following criteria: technologically simple, low Operation and Maintenance, low power consumption, takes advantage of the local physical conditions, and preferably breaks down the contaminant to harmless products. Several "green" technologies are under investigation at Site 300: enhanced in situ bioremediation, ex situ bioremediation, phytoremediation, iron filings, and barometric soil vapor extraction. The presentation will include: a brief description of the site conditions, maps of the location and magnitude of contaminants of concern, and a brief description of each of the "green" technologies.

Work performed under the auspices of the U.S. Department of Energy by Lawrence Livermore National Laboratory under Contract W-7405-Eng-48.

John P. Ziagos is the Site 300 Project Leader for the Environmental Restoration Program & Division at Lawrence Livermore National Laboratory. He has twenty-five years of diversified geotechnical managerial and research experience in the fields of environmental restoration, numerical and statistical analysis, reservoir characterization and simulation, well log and structural geology analysis, geostatistics, conditional simulation, mapping, and software development. Dr. Ziagos holds a BS degree in mathematics and physics from Western Illinois University, and a Ph.D. in geophysics from Southern Methodist University.

Session XI

Stewardship: Policy and Program Perspectives Panel Session

Michael Barainca, U.S. Department of Energy, Headquarters

Stewardship obligations for DOE sites include development of long-range and comprehensive land use plans, and long-term monitoring, surveillance, and maintenance for any waste or contamination left on site after EM activities have been completed. Sites that have experienced stewardship issues or have devised stewardship strategies are invited to submit abstracts.

Results of the NDAA Long-Term Stewardship Report to Congress

Janet Bashaw; Meg Reynolds; Kyle Tanger; and Joanna Wilson, Project Performance Corporation and Jonathan Kang, DOE Headquarters

On August 5, 1999, Congress directed the Secretary of Energy, through the conference report on the National Defense Authorization Act (NDAA) for Fiscal Year 2000, to collect and submit to Congress data on DOE's existing and anticipated long-term stewardship obligations at sites where environmental restoration activities will be complete by 2006. This presentation will present the goals, approach, and results of the report developed in response to this congressional mandate, and will represent the latest data available from DOE's field sites on the anticipated scope of its long-term stewardship obligations. The NDAA Long-Term Stewardship Report (due to Congress by October 1, 2000) will provide a snapshot of the Department's understanding of those activities, highlight areas where significant uncertainties remain, and inform stakeholders of the nature and extent of the long-term obligations that will be required at virtually every DOE site to ensure that public health and the environment remain protected, and in the future.

Janet Bashaw is a Vice President at Project Performance Corporation. She is an environmental science and policy analyst with expertise in conducting technical, regulatory, and policy analyses. Ms. Bashaw is currenlty working with DOE and DoD to identify opportunties for streamlining restoration initiatives, accelerating site closure, and identifying long-term sterwardship needs and responsibilties.

Long-Term Stewardship - A State Perspective

Cain Diehl and Dr. Gerald R. Hill, Southern States Energy Board

The U.S. Department of Energy (DOE) is expected to ensure Long-Term Stewardship (LTS) at 109 sites in 27 states across the U.S. DOE is currently developing strategies through the Office of Long-Term Stewardship. Two reports are due at the end of year 2000: 1. LTS Study for the PEIS Settlement and 2. Congressional Report on LTS.

When planning any remediation project, DOE benefits by involving the pertinent state regulatory agency in the process as early as possible. The same is true for developing long-term stewardship strategies. In order to create efficient, comprehensive strategies, DOE must involve the states early in the decision making process. Multi-state organizations such as the Southern States Energy Board, Western Governors' Association and the Interstate Technology and Regulatory Cooperation Work Group should be utilized to get state regulators on sites to evaluate LTS monitoring, capping, and containment technologies. In turn, the state regulators could work with DOE, local stakeholders and policy makers to build trust within the community and locally distribute ownership responsibilities.

Following are several major issues that states should contemplate:

1. Once a site enters the long-term stewardship phase, who has the enforcement authority?
2. How can we assure that long-term funds will be available for LTS?
3. How do we assure that the best technology is being used?
4. How do we evaluate cost savings for the long-term?

To resolve these issues, first a statute could be developed under RCRA that allows the state to set up an environmental funding mechanism, to assure that "long-term funding" is available, while defining the state's enforcement responsibilities. The state and DOE would have to negotiate this mechanism. Also, a "revisit clause" could be incorporated into the RCRA permit to reevaluate the technologies being used at a site and provide the opportunity to upgrade. In order to evaluate cost savings for the long-term, a certain number of years should be considered in the planning process. This could also be incorporated into the RCRA permit.

The bottom line is DOE should involve the states early in the planning process so that these issues may be resolved quickly.

Cain Diehl is currently in the position of Technology Programs Analyst at the Southern States Energy Board and serves as the Eastern Circuit Rider for the Interstate Technology and Regulatory Cooperation Work Group. In this capacity, he provides research and technical support for environmental policy and technology projects. His position involves maintaining a close working relationship with state regulators, environmental policymakers, technology developers, industry, and stakeholders. Mr. Diehl has a B.S. in Geology from the University of Florida.

The Question of Long-Term Stewardship Responsibilities at Facilities with Continuing Non-EM Operations

Deborah D. Griswold, Albuquerque Operations Office and George Allen, Sandia National Laboratories

Long-term stewardship (LTS) will be required at a majority of Department of Energy (DOE) sites, and most for an indeterminate length of time. Many of these sites will continue to have active non-Environmental Management (EM) operations long after the remediation operations are completed. LTS is a Federal responsibility that only ceases when it is demonstrated that there are no unacceptable risks at the site. Many of the details regarding LTS are not fully developed. In particular, it is not clear at present which organizations will have long-term stewardship responsibilities at facilities with continuing non-EM operations. The DOE Program Secretarial Offices for sites with continuing non-EM missions currently do not have LTS as a part of their mission. Therefore, it must be determined which organization will have LTS responsibilities at these sites.

A work group was tasked by DOE's Long-Term Stewardship Office to develop a paper discussing and analyzing the issues associated with LTS at facilities with continuing non-EM operations. This Multi-Program LTS Working Group is comprised of representatives from several DOE programs from both Headquarters and the Field. Relevant case studies were reviewed in order to help develop the issues and recommendations.

Deborah Griswold has 14 years of experience in environmental remediation. As a Team Leader in the Environmental Restoration Division of the DOE Albuquerque Operations Office, Ms. Griswold has responsibility for many crosscutting programmatic areas, including Long-Term Environmental Stewardship. She received her B.S. ChE from New Mexico State University in 1984.

The Draft Long-term Stewardship Study

Robert E. Hegner, Ph.D. and Steven Livingstone, ICF Consulting

This presentation will summarize the issues facing DOE in planning for and implementing long-term stewardship, options for addressing these issues, and public reaction to the Draft Long-term Stewardship Study. Issues to be discussed include: the relationship between cleanup decisions and long-term stewardship requirements; maintenance of engineered and institutional controls; real property management and transfer; information management; funding and financial management; management of natural resources; management of cultural resources; and the sustainability of long-term stewardship over many generations. A better understanding of the issues and challenges faced by DOE will allow individuals and organizations within and outside of the Department to make more informed decisions that shape long-term future stewardship nationally and at individual sites.

Robert Hegner has more than 25 years of experience in strategic planning, policy analysis, environmental assessment, and original research. Dr. Hegner has provided senior leadership and management for several Environmental Management life-cycle cost estimates (the Basline Environmental Management Reports, Paths to Closure) and long-term stewardship planning efforts (Managing Data for Long-term Stewardship, From Cleanup to Stewardship, the Draft Long-term Stewardship Study).

National Science and Technology Needs and Applications for Long-Term Stewardship

Roger Mayes; Jacob Dustin; Greg Frandsen; and Paul Kearns, Idaho National Engineering and Environmental Laboratory

Long-Term Stewardship (LTS) is: "all activities required to protect human health and the environment from hazards remaining after cleanup is complete." The Idaho National Engineering and Environmental Laboratory (INEEL) is the DOE Lead Laboratory for Science and Technology for LTS.

The work scope for the INEEL S&T portion of the LTS program was divided into three activities:

1) Initial Needs Assessment: Numerous processes have been employed within DOE to identify needs for research or technology to solve critical EM problems. These processes have utilized DOE site operations, environmental restoration and waste management, and research personnel, along with regulators and stakeholders to define where needs exist for technology development. The needs identified by these groups were reviewed to initially determine which previously identified S&T needs have LTS components.
2) Baseline Technology Inventory Report: Numerous DOE sources were consulted for applicable information as were other Federal agencies (e.g., Environmental Protection Agency, Department of Defense), universities, and private industry R&D projects that have applicability to DOE's LTS needs. A search of these sources was conducted to identify research already in progress or planned that may yield solutions to DOE LTS needs.
3) Initial S&T Plan: The initial needs assessment and the baseline technology inventory report were used to determine current LTS needs that are not being met by existing technologies or by research currently in progress. This then guided the preparation of the initial LTS S&T plan (roadmap) for the continuing process of identifying and prioritizing LTS needs and for prioritizing and funding S&T projects to meet those needs.

Roger Mayes is a scientist with the Idaho National Engineering and Environmental Laboratory (INEEL) Long-Term Stewardship Science and Technology program. He has diverse experience in project/program management, waste management and environment, safety and health activities at DOE facilities. Dr. Mayes has a B.S. degree in Biology, a M.S. in Radiological Sciences, and a Ph.D. in Environmental Sciences, all from Purdue University.

Long-Term Performance: Subsurface Contaminants Focus Area Activities, Functional Applications for the Long-term Stewardship Program

Scott McMullin, U.S. Department of Energy and Michael G. Serrato, WSRC/SRTC

The U.S. Department of Energy is developing the strategy and policies for the Long Term Stewardship (LTS) Program. In parallel to and in coordination with this program, the Subsurface Contaminants Focus Area (SCFA) is providing technology development of the functional elements for practical application of remedial activities and verification and monitoring methodologies. The fundamental hierarchy for the LTS considerations consists of principles, policies, and programs. The basic principles are first, the natural ecological systems and associated time scales issues, and second, the laws and regulations driving environmental issues. The policies being developed reflect the basic governing principles, while the technology development programs provide the functional application of these principles in harmony with basic principles and extant policies. One aspect cannot be defined or function without the other. As the SCFA develops tools and systems to address the data gaps for LTS, the basic principles and natural systems must be considered, managed, and addressed. The key to performance assurance in the long term is through the use of operational windows, as a function of risk and performance assessments to bracket the uncertainty in the long-term time scale. Supporting this effort, SCFA is developing a overarching technical strategy, which includes the current efforts addressing long term cover systems, verification and monitoring instrumentation and methodologies, and the implementation and instrumentation at the DOE-FERNALD site. These activities provide a baseline for technology development activities, which will be enhanced as needs and data gaps become more completely developed.

Scott R. McMullin is the DOE Office of Science and Technology, Subsurface Contaminants Focus Area, Source Term Containment and Remediation Product Line Manager, Savannah River Site, Aiken, South Carolina. Mr. Mullin oversees the technology development program activities for surface and subsurface containment barriers across the DOE complex to address end user technology gaps. He holds a Bachelor's and Master's degree in Civil Engineering from Brigham Young University. Mr. McMullin is currently a PhD. candidate at the University of South Carolina. He spent five years at the Westinghouse Savannah River Company, Environmental Restoration Department and has worked at DOE-SR for the past seven years.

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Session XII

SCFA: Natural Remediation Process: Lessons Learned through Research, Development, and Application

Scott McMullin, U.S. Department of Energy, Savannah River Operations Office

The panel session will focus on the state of science in developing and applying natural remediation processes to remediate subsurface contamination. Panelists will address outstanding research and development issues associated with various technologies, monitoring, risk management, cost considerations, and regulatory issues. Specific areas for discussion include: the use of phytoremediation to remediate metals and radionuclides in soils; natural analogs to evaluate the performance of long-term caps and vegetative covers; the application of bioremediation to remediate TCE in groundwater; and the use of monitored natural attenuation. Case studies will be used throughout the discussion to highlight specific areas of success with these remedial technologies as well as the challenges faced by DOE sites in remediating subsurface contamination.

Phytoremediation to Target VOCs and Tritium at depths at Argonne National Laboratory

M. Cristina Negri, Ray R. Hinchman, John Quinn, James B. Wozniak, Larry Moos, Argonne National Laboratory, Argonne, Illinois, and Edward E. Gatliff, Applied Natural Sciences, Inc., Hamilton, Ohio

The 317/319 Areas at Argonne National Laboratory are contaminated by VOCs in soil and groundwater and low levels of tritium in the groundwater. The U.S. Department of Energy funded the deployment of a phytoremediation system in the 317/319 Area to hydraulically contain groundwater migration and remove the VOCs and tritium within and downgradient of the source areas. This installation was preferred over a more expensive and less efficient baseline method of a cap and extraction wells.

The installed system consists of plantings of hybrid willows and special deep-rooted hybrid poplars. In consideration of the complex hydrogeology of the site, the patented processes TreeMediation® and TreeWell® of Applied Natural Systems Inc. were used to enhance the aggressive rooting ability of hybrid poplars and target the contaminated groundwater 10 m deep, excluding a clean, perched aquifer at approximately 5 m below ground.

The trees, planted in the summer of 1999, are showing evidence of VOC degradation and are expected to provide full, year-round hydraulic control by the year 2003. Cost savings, reduction in cleanup schedule and risk, and increased soil fertility offer additional benefits of the technology.

Maria Cristina Negri is a soil scientist and agronomist, sharing the leadership of the phytoremediation activities at ANL. She worked on a proprietary technology for the removal of cesium-137 from Chernobyl milk, and on a soil washing technology. She also convened a working group of experts from the European Union, aimed at creating safety standards for growing media and soil improvers.

BioRemediation: The hope and the Hype

Dr. Terry C. Hazen, Head, Center for Environmental Biotechnology, Lawrence Berkeley National Laboratory

Bioremediation has proven to be one of the most cost effective and environmentally sound remediation technologies available at sites where it will work. Though the petroleum industry has been using bioremediation to handle oil sludges (petroleum land farming) for more than 50 years, and a patent was issued for in situ bioremediation of gasoline spills in 1974, this technology is perceived as being "new". A plethora of new strategies have shown that chlorinated solvents, PAHs, PCBs, UXO, metals, and radionuclides can be bioremediated, biotransformed, or bioimmobilized. These techniques include passive and active aeration, injection of various electron donors and acceptors, slow oxygen releasing compounds, chelating agents, surfactants and coupling with intrinsic processes (natural attenuation). A number of issues are emerging that have implications for use of bioremediation to environmental cleanup, eg. release of non-indigenous species, release of genetically modified organisms, horizontal and vertical gene transfer, weathered contaminants, treatment trains, final disposition of biomass, life-cycle costs, etc.

Terry C. Hazen is currently the Head of the Center for Environmental Biotechnology at LBNL, and the Program Lead for Environmental Remediation Technology Program at LBNL. Dr. Hazen has a Ph.D. Microbial Ecology. He has authored more than 148 scientific publications and has patents on 5 bioremediation processes licensed to more than 40 companies. Dr. Hazen's current research is focused on aerobic bioremediation of landfills, PAH contaminated soil, and solvent contaminated soil and groundwater.

Natural Analogs of Long-Term Engineered Covers

William J. (Jody) Waugh, MACTEC-ERS, Grand Junction

The DOE framework for evaluating long-term covers combines three tools: modeling, field tests, and natural analogs. Natural analogs provide clues as to possible long-term changes in the performance of engineered covers. Data from natural analogs is needed to evaluate inevitable changes in covers that cannot be captured using only short-term field tests and numerical models. Natural analogs may also have a role in communicating to the public that numerical predictions have real-world complements. Natural analog data exist for climate change, ecological change, and pedogenesis. Paleoecological data provides evidence of how a changing climate or a secondary disturbance may influence directions and rates of pedogenesis, vegetation structure and diversity, and animal habitat on an engineered cover. Effects of plant succession on evapotranspiration and the soil water balance of covers can be inferred by evaluating plant communities representing successional chronosequences. Similarly, analogs of habitats likely to develop on engineered covers provide evidence of the potential for biological intrusion. Finally, possible future changes in soil physical and hydraulic properties of engineered covers can be inferred from analogous natural and archaeological soil profiles.

William J. (Jody) Waugh has 20 years of research and applied experience in restoration ecology including evapotranspiration (ET) cover designs, natural analogs of cover performance, retrospective environmental monitoring, and phytoremediation using desert phreatophytes. Dr. Waugh works for MACTEC-ERS at the DOE Environmental Sciences Laboratory in Grand Junction, Colorado.

Session XIII

FRAMES Demonstration Session

Paul Beam, U.S. Department of Energy, Headquarters

FRAMES is a system that integrates environmental models and databases into a single system in support of DOE's decision analysis process. The FRAMES software platform was co-funded by DOE and EPA to facilitate environmental and human health assessments. This information feeds directly into decision analysis efforts for DOE planning and actions. FRAMES is currently being used by DOE, EPA, DOD, and industry to link different environmental models together to create a problem-specific modeling system. The models can vary in scale and resolution but there are potential pitfalls that must be addressed with integrating different models together. FRAMES is a very powerful tool for easily and efficiently integrating environmental models together but developers and users must be very careful that the simplifications and assumptions of the different models do not violate good science. Steps are being taken to improve this issue with FRAMES. The purpose of this session is to discuss advantages and disadvantages of model integration and steps to improve the process.

Current Projects:

DOE FRAMES Support Project - DOE-EM
Pantex Baseline Risk Assessment - DOE-AM
Integration of GENII into FRAMES - EPA-ORIA
Hazardous Waste Identification Rule (HWIR) - EPA-ORD
Surface Impoundment Study - EPA-OSW
ARAMS - FRAMES Project - DOD-COE WES
Australian Risk Assessment - Coffey Geosciences

No abstracts submitted for this session.

Session XIV

Overcoing Barriers to Long-Term Monitary Technology Developement

Cary Tuckfield, Westinghouse Savannah River Company

The Environmental Restoration Division of the Savannah River Site (SRS) is deploying three technologies in the groundwater monitoring program that contribute significant cost savings. Sampling of the >2,000 wells in the SRS groundwater monitoring network with traditional methods generates large volumes of purge water. In the past, the purge water was discarded on the ground adjacent to the sampled well. However, more stringent regulatory requirements mandate management of purge water as a hazardous waste when it contains constituents that exceed certain threshold levels. This change in regulatory requirements has led to increasing waste management costs for containment, treatment, and disposal. An innovative monitoring well purging mechanism, the Purge Water Management System (PWMS), has been developed and successfully demonstrated at SRS. The PWMS is a closed-loop, non-contact system used to return purge water to the originating aquifer after a sampling event without having significantly altered the water quality.

The Aqueous Waste Software Application (AWSA) was developed to identify monitoring wells that require containerization and treatment for purge water generated during sampling. AWSA is a SASÔ application that retrieves the necessary data for wells selected by the user from the Site's extensive groundwater database. The program then applies an algorithm to the analytical results to determine whether containerization is required for the specified wells. AWSA produces output files that designate the containerization status of each of the selected wells, provide statistics to support the treatment facilities' permits, and assist with controlling and scheduling the handling of the managed purgewater.

The Groundwater Sampling Reduction Process is used to optimize the selection of monitoring wells placed on a sampling schedule. The process consists of well evaluations using the groundwater database. Wells that are found to be technically irrelevant, redundant, unreliable, and not considered essential from a regulatory standpoint can be removed from the sampling schedule to enhance the reliability of the data and reduce the cost of sampling and analysis.

No abstracts submitted for this session.

Session XV

ITRD Panel Session

Malcolm Siegel, Sandia National Laboratories

Participation in the Innovative Technology Remediation Demonstration (ITRD) program contributes to the technology deployment process. It provides support for screening technologies, conducting treatability tests and field demonstrations, and developing data to support regulatory and stakeholder presentations. Abstracts are being solicited for sites that have used the ITRD program.

The Innovative Treatment Remediation Demonstration (ITRD) Program: Overview of Goals and Accomplishments in FY2000

Malcolm Siegel and Michael Hightower, Sandia National Laboratories; Tom Hicks, Department of Energy SR/SCFA; Thomas Crandall and Paul Beam, Department of Energy Headquarters

The Innovative Treatment Remediation Demonstration (ITRD) Program accelerates the use and acceptance of new cost-saving technologies to solve site-specific remediation problems at DOE sites. Adoption of new remedial approaches at DOE sites may be impeded by 1) the lack of validated full-scale cost and performance data for new technologies, 2) industry fear of penalties or fines associated with schedule delays, and 3) lack of regulatory experience with innovative technology. The techniques used by ITRD to overcome these barriers include: 1) formation of Technical Advisory Groups (TAG) composed of all relevant stakeholders to assess new technologies for site-specific requirements, 2) treatability and pilot studies for technologies selected by the TAG, and 3) evaluation of test results to obtain cost and performance information.

This talk will provide an overview of the projects carried out in fiscal year 2000. These included projects at different stages of maturity at Paducah, Oak Ridge, Hanford, Mound, Pantex, Los Alamos, and Savannah River. They involved initial screening of 30+ technologies and deployments or detailed evaluation of 12 different technologies to remediate soils, ground water and surface water at 9 different locations within the DOE complex. Contaminants at the sites include chlorinated solvents (dissolved and DNAPL), polychlorinated biphenyls (PCBs), explosives, radionuclides, and heavy metals.

Malcolm Siegel is Technical Coordinator of the ITRD program and Principal Member of the Technical Staff at Sandia National Laboratories. He has 19 years of research and project management experience involving laboratory studies, transport simulations, and performance assessment in support of nuclear waste management, reactive treatment zones, and natural attenuation.

The Innovative Treatment Remediation Demonstration Program at the Paducah Gaseous Diffusion Plant

John Sheppard, U.S. DOE Paducah, KY; Gary Bodenstein and Jim Wright, USDOE; Mike Hightower and Malcolm Seigel, Sandia National Laboratories

The Environmental Restoration program at the Paducah Gaseous Diffusion Plant (PGDP) has a history of pursuing innovative technologies for site remediation. During the TIE Conference in Chicago October 27-28, 1998, PGDP personnel consulted with managers of the ITRD program regarding leading edge technologies that may be applied to the cleanup of an extensive ground water plume of TCE and Tc-99. The ITRD responded with a Technical Assistance Group (TAG) and a program that has provided specific recommendations to the ground water Feasibility Study and treatability studies. Another paper in this session will address the treatability studies. The Paducah ITRD utilized a multi-discipline, multi-agency TAG; the TechCon web site served as a communications vehicle for the TAG and stakeholders such as the Site Specific Advisory Board. In response to a specific request from the Department's Assistant Secretary for Environmental Management, a Deployment Assistance Team (DAT) assessed Paducah ground water cleanup activities and provide the ASEM with recommendations for early deployments of groundwater remediation technologies. The DAT relied extensively on prior work of the ITRD program in providing a briefing to the Assistant Secretary. Due to the success of support to the groundwater program, representatives of the regulatory agencies have recommended that the PGDP surface water remediation program also utilize this approach. A new TAG including surface water technical experts is in the process of organization.

John Sheppard has worked for the Department of Energy for nine years. He is currently the Acting Deputy Site Manager and ITRD program point of contact at the Paducah Site Office. He represents Oak Ridge Operations on the EM-50 Subsurface Contaminants Focus Group Steering Committee. As Senior Engineer, John manages the implementation of innovative technologies for environmental restoration and waste management. From 1990 to 1998, John was Environmental Management Program Manager and Deputy Site Manager at the Portsmouth, OH site office. He holds BS, MS, and PhD degrees in Chemical Engineering from the University of Tennessee, Knoxville.

Paducah Groundwater ITRD

Wu-Ching Cheng, Michael Hightower, and Malcolm Siegel, Sandia National Laboratories; Gary Bodenstein and John Sheppard, DOE/Paducah; and Walt Richards, Science Applications International Corporation

The Paducah Gaseous Diffusion Plant ground water is contaminated with organic and radioactive species, on the order of a few ppm of TCE and 2000 pCi/L of Tc-99 in the distal plumes. The ITRD project began in early 1999 with participants from DOE, the Paducah site contractor, EPA Region IV, the State of Kentucky, and technical experts from the National Laboratories. About 30 technologies were screened for applicability to vadose zone and saturated zone remediation through technical presentations by the suppliers followed by discussion. Detailed geological and site contamination data was given to a short-list of technologies to solicit cost estimates for remediation of a set of specified contaminated regions including vadose and saturated source zones and distal zones. Based on the cost estimates, a second screening resulted in candidates for pilot studies. Another round of presentations followed by discussion resulted in the selection of C-Sparge (a recirculating well technology employing ozone) in the saturated plume with intermediate contaminant concentrations as a pilot study to be supported by ITRD and Six-Phase Heating in a heavily contaminated region of the vadose zone to be supported by DOE/Paducah. Concurrently, the ITRD supported column studies comparing the performance of a humic material and zero-valent iron (ZVI) as media for application in a permeable treatment zone (PTZ). The Paducah site will implement a pilot PTZ using ZVI this year.

Wu-Ching Cheng holds masters degrees in Chemical and Environmental Engineering. He worked six years in separations research and seven years in environmental engineering including enhanced SVE, disposal performance assessment, radioactive waste stabilization, Hanford Tanks flammable gas safety and criticality safety. Mr. Cheng has worked with ITRD since October, 1999.

Combination Air/Sparge Soil Vapor Extraction System at the Mound OU-1 Site

Gary S. Brown, Ph.D., Sandia National Laboratories and Mark Spivey, Babock and Wilcox of Ohio

The Remediation Demonstration Program conducted a treatment technology study at the DOE Mound OU-1 Site in Miamisburg, Ohio to remediate chlorinated volatile organic compounds (VOCs) in the landfill vadose and saturated zones. The treatment system evaluated was a combination of air sparge and soil vapor extraction technologies. The study objectives were to evaluate the effectiveness of 1) combining air sparge and soil vapor extraction technologies and 2) on-site process monitoring for optimization of system operational parameters.

The air sparge/soil vapor extraction system consists of valved extraction wells, valved French drains, and air injection wells. The valves on the extraction wells and French drains allow operators to adjust airflow for individual well optimization based on real time information provided by an on-line automated gas chromatograph system.

This report covers system operations from start-up on December 16, 1997 through to February 16, 1999. As of February 1999, 1230 kg of VOCs had been removed from the OU-1 Site by the vapor extraction system. The total chlorinated contaminant concentrations in the unsaturated zone decreased from an average of 510 ppmv to an average 5.2 ppmv.

Gary S. Brown, Ph.D. is a senior Member of the Technical Staff at Sandia National Laboratories, Albuquerque, New Mexico. He is currently involved with DOE and the University of New Mexico in the development and evaluation of innovative waste treatment and site remediation technologies.

ITRD Explosives Project at Pantex and LANL

James M. Phelan, Sandia National Laboratories; J. Childress, Pantex; and D. Hickmott, Los Alamos National Laboratory

An Innovative Technology Remediation Demonstration project for explosives in soil, surface water, and ground water was started in January 1998 for environmental restoration problems at Pantex and Los Alamos National Laboratory. The project enlisted support from the US Army Environmental Center, US Army Waterways Experiment Station, U.S. Environmental Protection Agency, INEEL, and regulators from New Mexico and Texas. The unique aspects of each site required a thorough analysis of the many remediation alternatives and emerging technolgies suitable for treatment of very high to trace levels of explosives in the various media. A mulit-technology approach to solving the problems at each site was required and the progress of treatability studies and full-scale projects will be provided.

James M. Phelan has been working in the environmental restoration field for about 15 years with operational experience in characterization, remediation and management of the Sandia ER program, technology development efforts related to organics and metals/radionuclides, and recently with explosives in soils and water.

Assessment of Carbon Tetrachloride Plume Transport and Attenuation for the Hanford Innovative Technology Remediation Demonstration Project

Michael J. Truex; Charlie Cole; Christopher Murray; Rick Cameron; and Christian Johnson, Pacific Northwest National Laboratory; Scott Petersen, Bechtel Hanford Inc.; and Arlene Tortoso, U.S. Department of Energy, Richland Operations Office

Carbon tetrachloride is dispersed over an area of about 10 km2 in the ground water at Hanford. Attenuation mechanisms such as partitioning to the aquifer solids and hydrolysis reactions may limit the migration of carbon tetrachloride. Whether these mechanisms can attenuate the plume prior to contamination reaching the compliance point is dependent on the rate and extent of the attenuation and the magnitude of the contamination source to the ground water. Transport simulations were conducted to estimate the amount of remediation necessary to reduce the source of contamination to a level where natural attenuation mechanisms can mitigate the remainder of the plume prior to contamination reaching the compliance boundary. The uncertainty in this estimate due to uncertainty in the input parameter values was also evaluated.

Michael Truex is an Environmental Engineer at the Pacific Northwest National Laboratory. He has worked the past 8 years in remediation technology development and application. The work to be presented is a collaborative effort of several PNNL reseachers and other members of the ITRD Technical Advisory Group.

Hanford 100N Area ITRD Project

Cecelia V. Williams and Malcolm Siegel, Sandia National Laboratories; Atlene Tortoso, DOE Richland Operations office; and Scott Peterson, Bechtel Hanford, Inc.

The purpose of the Hanford 100-N Area ITRD Project is to identify and evaluate innovative technologies that can be used to resolve the Sr-90 contamination problem at the site. The Sr-90 contamination is result of operations and leaks from reactor fuel rods that contaminated the reactor cooling water. The reactor cooling water was drawn from the Columbia River. After a once-through cooling process, the water was discharged into two surface trenches. The Sr-90 leached into the soils underneath the trenches and then into the ground water.

This paper discusses site evaluation including bank stability studies and ground water modeling. In addition, the paper will discuss combinations of remedial options that include natural attenuation, phytoremediation, permeable and impermeable barrier emplacement, soil flushing, and stabilization.

Cecelia V. Williams is a Principal Member of the Technical Staff at Sandia National Laboratories. Ms. Williams has been at SNL for 18 years with 9 years in Environmental Restoration Technology development. She is currently working on Chemical Biological Warfare (CBW) agent decontamination, is the ITRD lead for the Hanford 100-N Area Project, and leads the Environmental Measurement-While-Drilling (EMWD) team.

Session XVI

GIS Panel Session

Russ Beckmeyer, Westinghouse Savannah River Company

Geographic information systems (GIS) provide high-quality data for ongoing remedial activities, for better understanding of the data, and for communicating concise, spatially-oriented data to decision makers, regulators, and other stakeholders. Presentations are requested on site-specific GIS applications and how they are used in the decision-making process.

Meeting Users' Needs: Practical Integration of GIS

Russell R. Beckmeyer, Westinghouse Savannah River Company

Less than three years ago Savannah River Site's (SRS) Geographical Information Systems (GIS) data architecture could be described as being "islands of data amongst broad spans of ocean." In contrast, today a comprehensive collection of GIS information, large sets of environmental and geotechnical data, and fifty years of historical photography are available to all SRS personnel through one integrated GIS interface. A key to the success of this work has been a focus on practical application of commercial-off-the-shelf technology and strong, service-based, interaction with the data providers and information users.

This presentation will discuss (a) development of an Enterprise Environmental Data and GIS Data Center, Data Clearinghouse and Distributed Data Warehouse, (b) development of the underlying information technology architecture, (c) development of a GIS based data access tool, (d) implementation of data configuration control procedures and data stewardship roles, and (e) user training. The presentation will include a discussion of how these efforts have led to a partnering with SRS regulators to implement GIS-based virtual conferencing.

Russell Beckmeyer is Manager of Environmental Data and Geographical Information Systems for the Westinghouse Savannah River Company at the Department of Energy's Savannah River Site. Dr. Beckmeyer holds a Ph.D. in Mechanical Engineering from the University of Missouri-Rolla. He has twenty-five years of information technology experience and has been employed at SRS for twenty-three years.

GIS Considerations for Closure

Denise Bleakly, Sandia National Laboratories

Sandia National Laboratories, in Albuquerque, New Mexico, is 90% complete in the clean up of approximately 200 environmental restoration (ER) sites. One of the key components to this clean up is the Environmental Geographic Information System (EGIS) which has grown to over 10 gigabytes worth of spatial data concerning the physical environment, the individual ER Sites, and the thousands of samples taken over the last decade. This includes approximately 3000 data layers; 9000 output files, and approximately 9000 program files used to create analysis and map output.

As part of our planning process for the ER Project closure and the evolution towards stewardship, the EGIS team is planning to modify the work of the EGIS. The ER Project closure plan includes archiving data on an ER site-by-site basis. This paper will discuss GIS considerations for closure that the EGIS team are currently working on: Data archiving of ER site specific information; long term access to GIS data related to ER Sites; on-going Long Term Stewardship responsibilities; and effectively downsizing the EGIS to meet the staffing targets for long term stewardship in 2004. We will present our current plans and preliminary results from some pilot project work for data archiving.

Denise Bleakly is a GIS Specialist and a Principal Member of the Technical Staff at Sandia National Laboratories in Albuquerque, New Mexico. She holds both a Bachelors and Masters Degrees in Geography and has spent the last 10 years working at Sandia developing the Environmental GIS to support the Environmental Restoration Project.

Soils Geochemistry Analysis with ArcView Geographic Information Systems (GIS) Software

James S. Bollinger, Westinghouse Savannah River Company

The Savannah River Site has amassed a large quantity of soils geochemistry data, which is archived in an Oracle database. To facilitate easy user access to this data, a software extension has been developed for ArcView that allows users to interact with the data from a simple dialog. The user can choose the specific constituent, soils project name, and measurement units and the ArcView extension does the rest. The requisite data is retrieved from the database and processed to average duplicate results and ensure that all measurements are converted into consistent units. Since the soils data is taken at discrete depth intervals, the user is given a choice of depth intervals to be analyzed. Soils data for these depth intervals is then processed into ArcView themes for display on a planimetric map. Using this new ArcView extension, soils data that once required hours or days to retrieve and plot can now be displayed for analysis in minutes.

Jim Bollinger is a principal engineer at the Westinghouse Savannah River Company. His professional background includes groundwater transport, heat transfer and fluid dynamics modeling, and geographic information systems applications. Mr. Bollinger has a B.S. in Nuclear Engineering from the University of Cincinnati and an M.S. in Mechanical Engineering from Northwestern University.

The Emergency Communication Network (ECN) GIS Facility Mapping Project

Al Guber; J. Russ Coffey; and Robert Noto, Bechtel Nevada - DOE Remote Sensing Laboratory

In support of the Emergency Communication Network (ECN) for the Department of Energy Headquarters Emergency Operations Center (EOC), Bechtel Nevada's GIS team at the DOE Remote Sensing Laboratory (RSL) has compiled facility level GIS data sets for all major DOE facilities across the nation. The data was compiled in coordination with the individual DOE facilities to gather and update existing GIS and CAD data sets. Data was then processed into a common GIS database format at the RSL to be used for ECN GIS applications. This data has been used to compile hardcopy atlas products and to populate a large database used for emergency response and emergency management GIS applications. The data has also been incorporated into an intranet (ECN only) web-page application through which the user can view and query the data interactively. The results of this effort provide the only known common database for facility level mapping of all the major DOE facilities in the country.

Al Guberthe GIS Team Leader at the DOE Remote Sensing Laboratory. He has been doing Emergency Management and Environmental GIS applications for the DOE for the past 10 years. Mr. Guber has a BS from Penn State in Earth Science and a MS in Geography from the University of Arizona.

GIS Management of Waste Units at the Savannah River Site

Larry D. Koffman and Steve Hevel, Westinghouse Savannah River Company

Savannah River Site has more than 500 sites classified as waste units. Managing information about this many sites with input from numerous organizations and individuals has been a challenge over the past several years. Current efforts are focused at using database technology to manage tabular information combined with GIS to manage spatial information.

In 1996 we discovered that we did not have reliable spatial location information for all the waste units. This initiated a program to GPS survey all of the waste units to provide a single, reliable GIS data layer of waste unit location. Concurrently with this GIS effort, a database effort was initiated to compile various information about the waste units into a single Access database. The initial release of the GIS data layer and the Access database occurred in Spring 1999.

The results of these data management efforts have already proved to be beneficial. Environmental Restoration project teams are using GIS to visualize data about the waste units. The information is being served to a wider community through web based applications such as ESRI's Internet Map Server (IMS). Custom applications allow various types of information to be dynamically viewed by management and DOE.

Larry Koffman has a Ph.D. in Engineering Science from Caltech and was an Assistant Professor of Mechanical Engineering at Georgia Tech prior to coming to the Savannah River Site in 1985 to work on thermal hydraulic modeling of the reactors at SRS. Dr. Koffman has worked in ground water modeling, which led him to using GIS for handling spatial data. He has been a leading advocate of GIS at SRS for the past six years.

GIS Applications for Watershed Risk Analysis and Data Needs Evaluations

Tracy J. McLane; Gerald McLane; and Susan Dyer, Site Geotechnical Services (EA3A0), PE&CD, Savannah River Site

A GIS project was developed to display and evaluate the vast amount of environmental, geographic, and hydrogeologic data available for the Savannah River Site's (SRS) Integrator Operable Unit (IOU) program. The IOU program is performing RI/FS/BRAs on the surface water bodies within the site's six watersheds. These surface water bodies are referred to as IOUs because they ultimately integrate all site-related contaminants to points of potential receptor exposure. The project assembles the graphic and tabular data in a user-friendly format that enables analysis of every aspect of the conceptual site model. The most significant feature of the IOU GIS project is a customized utility application, which allows users to perform real-time human health, and ecological risk evaluations, obtain statistical summaries, and create time series plots of the environmental data of interest. Unlike previous hard copy deliverables, a fully automated compact disc effectively communicates the maps, tables and hundreds of thousands of analytical records from a relational database. This enables reviewers to select and manipulate the graphic and/or tabular data of interest and customize it to their specific evaluation needs.

Tracy McLane is a GIS Manager/Programmer/Analyst for Site Geotechnical Services at the Savannah River Site, where she specializes in GIS database design, implementation and automation.

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Session XVII

Long Term Stewardship: Lessons Learned Panel Session

Brian Bowser, U.S. Department of Energy, Idaho Operations Office

Stewardship obligations for DOE sites include development of long-range and comprehensive land use plans, and long-term monitoring, surveillance, and maintenance for any waste or contamination left on site after EM activities have been completed. Sites that have experienced stewardship issues or have devised stewardship strategies are invited to submit abstracts.

Composite Analysis - The Right Tool for the Long-Term Stewardship Job

James R. Cook and Elmer L. Wilhite, Savannah River Technology Center

In the Implementation Plan for the Defense Nuclear Facilities Safety Board Recommendation 94-2, DOE committed to develop a comprehensive environmental management systems approach to the long-term protection of the environment from all sources of radioactive material left in the ground after remediation and disposal programs are completed. This approach would integrate the Department's efforts in land use planning, decommissioning, environmental restoration and waste disposal.

One of the first steps taken in this program was to require the sites with active disposal facilities to prepare a Composite Analysis, a modeling study to estimate doses to future individuals from past, present, and future sources of radioactive material that might interact with currently operating disposal facilities. The comprehensive environmental management approach is a generalization of the Composite Analysis methodology to an entire site.

Planning for long-term stewardship must include consideration of the kinds and amounts of radionuclides that can remain at DOE sites and yet not cause exceedance of relevant standards. The Composite Analysis methodology is exactly the right tool to use in making decisions about clean up actions and long-term land use.

James Cook has over twenty years experience in the field of radioactive waste management research and development, most recently heading up the SRS Performance Assessment and Composite Analysis Teams. He has also worked on site selection, site characterization and closure or both land disposal and tank systems.

Institutional Controls for Remediated Sites–An INEEL Case Study on Long Term Stewardship

Deborah Wiggins; Jacob D. Dustin; Patty Natoni; and Bryan Bowser, Idaho National Engineering and Environmental Laboratory

Five Record of Decisions have recently been signed at INEEL each of which have very specific requirements for institutional controls (ICs) as negotiated with the agencies based on recently promulgated EPA Region 10 policy. Although each of the five sites is very diverse in terms of types of historical releases and contaminants, the ICs are handled in a similar consistent manner. ICs at these sites form the framework for long term stewardship of CERCLA sites with contamination left in place after remediation at INEEL.

Many valuable lessons were learned during the process of developing these IC requirements. DOE did not have specific guidance for institutional controls and as a result EPA developed its own requirements which vary in stringency depending on the affected EPA region and agency person involved. Viewing of IC requirements for different periods of time and ownership scenarios was very valuable in identifying potential pitfalls. It was found that original risk and land use assumptions were being lost because of the way requirements were previously being handled in the RODs. For instance 3 PCB sites that were only cleaned up to industrial levels would have never been considered a problem for future residential use in 100 years without this further scrutiny. Also, contamination greater than 10 feet deep was not preserved for future land use considerations until this these specific IC requirements were identified. It was also found that general references to future deed restrictions was not substantive enough, because specific government requirements better define future land transfers whereas deed restrictions may not even be applicable. Finally the value of a Comprehensive Land Use Plan in tracking ICs is invaluable.

Deborah Wiggins has worked in the environmental area for 15 years. This included working with the regulators on establishing Long Term Stewardship Requirements for INEEL sites and coordinating compliance with these requirements. She is currently the Project Engineer for the CERCLA remediation of a lead contaminated site, a mercury contaminated site and a cesium contaminated site at the Central Facilities Area at the INEEL. Ms. Wiggins holds a MS in chemical engineering and a BA in chemistry.

State of the Art of Long-Term Stewardship, a Holistic Approach

Art W. Kleinrath, DOE-Grand Junction Office and Mark Plessinger, MACTEC-ERS, Grand Junction Office

The Department of Energy (DOE) Grand Junction Office (GJO) has been conducting stewardship activities for over ten years, since the Long-Term Surveillance and Maintenance Program was established and assigned to GJO in 1988. Stewardship activities currently cover a variety of sites including decommissioned nuclear reactors, uranium mill tailings disposal sites, and low-level waste disposal sites. These sites fall under the authority of several different pieces of environmental legislation having similar but varied regulatory compliance requirements. The GJO advocates a holistic approach to long-term stewardship where stewardship considerations are included in the pre-remediation planning phase and the remediation phase as well as during the stewardship implementation phase. Analog studies, technology applications, regulatory compliance, and stakeholder acceptance all need to be woven together to produce a set of remediation and stewardship goals and commitments that DOE, regulatory agencies, and stakeholders can realistically accept. Key to accomplishing this is the development of a flexible Long-Term Stewardship Plan that is capable of both defining the currently required stewardship activities and adapting to future technological or regulatory changes that can impact stewardship implementation. The goal of holistic stewardship is to have stewardship commitments that are protective of the public health and safety and the environment and are commensurate with the specific hazards associated with a given site.

Art Kleinrath received his B.S. from the University of Michigan, School of Natural Resources, in Resource Systems Management and his M.S. From the University of Florida, in Envirnomental Engineering. Mr. Kleinrath has worked in the environmental field since 1973. In industry, he has worked on varied projects from siting electric power line routes to working on the initial economic impacts of the then new State Implementation Plans in response to the Clean Air Act Amendments, to working on the first Superfund projects. After twelve years in the industrial side, Mr. Kleinrath joined the U.S. EPA, Region 5, in 1985, as a Remedial Project Manager/On-Scene Coordinator for CERCLA (Superfund). In 1990 he joined DOE to mange the CERCLA program at the Mound Plant. In 1995, with the Mound Plant closing, a reevaluation of the traditional program was necessary. In only five years, the Mound Plant has transferred title to some of the National Priority List (Superfund) property to a new private owner and application for delisting has been made. Institutional control of industrial lands use was the main remedy. As the maintenance of Mound pointed to increasing efforts to maintain the remedies as safe at DOE plants, Mr. Kleinrath became interested in Long Term Operation and Maintenance of the remedies and clean up choices. He has recently joined the Grand Junction Project Office to work toward a viable, responsible Long-Term Stewardship Program.

Risk, Information, and Long-Term Stewardship Decision Processes

Elizabeth K. Hocking, S. Y. Chen, Robert L. Johnson, and John D. Ditmars; Argonne National Laboratory

The aim of long-term environmental stewardship is the protection of human health and the environment following the closure of a cleanup site at which residual contamination exists. At its core, long-term stewardship is continuing risk management so long as the contamination resides at the site.

Argonne National Laboratory has been examining the decision processes involved in long-term stewardship to understand the opportunities and requirements for risk management. Of particular interest is the identification of risk management issues and relevant methodologies associated with the long-term management of risk that differ from these typically associated with the cleanup process. Many aspects of long-term stewardship risk processes are analogous to those in cleanup processes:

- determination of land uses
- identification of contaminants levels
- location of receptors
- assessment of risk.

However, in the case of long-term stewardship, these processes may have to be revisited numerous times as conditions change over decades. Changes can include contaminant releases from containment failures, changes in land use, and the introduction of new receptors.

Changing conditions in the long term require "adaptive risk management," i.e., risk management that adjusts to all such changes. A critical aspect of adaptive risk management is the information essential for evaluating changes in risk. Adaptive risk management drives the determination of information needs and the systems to acquire information. Examined are questions related to archiving information, deployment of sensors and other means of data acquisition during stewardship, and the integration of that information to support decision making.

Elizabeth K. Hocking is the Manager of the Environmental Policy Analysis Section of the Environmental Assessment Division at Argonne National Laboratory. She leads the project "Decisional Process Tool for Site Stewardship Evaluations" and is a consultant to the National Academy of Sciences Committee on Remediation of Buried and Tank Wastes (Long-term closure of DOE sites).

LLNL ER Stewardship Model: Coupling Science, Engineering and Cost

Richard Woodward and Zafer Demir, Lawrence Livermore National Laboratory

For nearly two decades Lawrence Livermore National Laboratory's (LLNL) Environmental Restoration (ER) program has aggressively pursued characterization and remediation of environmental contaminants in soil and ground water. Sophisticated hydrogeologic analyses, porous media modeling, and cost-effective engineering have led to interactive management of 40 plumes of contaminated ground water with 12 contaminants regularly using a suite of 10 treatment technologies. These technical approaches coupled with the recently developed Phoenix Project Management System now allows for an rational estimation of short and long term costs using Activity Based Costing methods.

This paper describes how LLNL combines these elements in a comprehensive model for examining project strategy and enabling a rational approach to ER Stewardship budget estimates. Algorithms are presented that couple specific plume concentrations, regulatory cleanup levels, remediation technologies, and cost. The influence of clean up levels, near-term budgets, reuse of treatment facilities, uncertainty, the aggressiveness of the well field management program, and other factors are examined for their effects on stewardship duration and costs. The results can lead to a comprehensive view of how to "optimize" budgets, resource allocations, and scheduling of efforts, thus enabling informed management decisions.

Work performed under the auspices of the U.S. Department of Energy by Lawrence Livermore National Laboratory under Contract W-7405-Eng-48.

Dr. Woodward has Ph.D. and MS Civil Engineer degrees from UC Berkeley and a BCE from the University of Santa Clara. He is responsible for project planning in the Environmental Restoration Division at LLNL and for development of Multi-Year Work Plans, the Baseline Plan and the Long Term Stewardship Plan. Prior to joining LLNL Dr. Woodward was a Geotechnical and Environmental Engineering consultant for over 30 years responsible for major geotechnical engineering aspects of large dams, bridges, nuclear power plants and buildings, and for assesment, design, construction and remediation of contaminated soil and ground water projects throughout the US. He has focused on application of practical decision tools to environmental restoration.

Lessons Learned with Long-Term Stewardship at Nevada Operations Office Sites/Performance Assessments

John Jones, U.S. Department of Energy, Nevada Operations Office

No Abstract

Lessons Learned with Long Term Stewardship Measurements

Ralph Skinner, U.S. Department of Energy, Oak RidgeOperations Office

The need for long-term stewardship was recognized by the Oak Ridge public long before the PEIS Settlement that has focused national attention on this issue. The Oak Ridge End Use Working Group developed recommendations for final land use on the DOE Oak Ridge Reservation (ORR) over a two-year period. This Site Specific Advisory Board (SSAB) sanctioned citizen group identified the need for long-term stewardship when making recommendations to leave waste in place which required perpetual institutional controls. In addition to publishing ORR end use recommendations, the working group also published long-term stewardship recommendations. Once the mission of the End Use Working Group was completed, the SSAB formed a Stewardship Working Group to continue the efforts initiated under the End Use Working Group.

The SSAB Stewardship Working Group has worked with DOE and the regulators in a Stewardship team to complete the ORR sections of the NDAA report. The working group has also assigned members to work directly with the DOE and regulators on the preparation of the ORR Stewardship Management Plan. The working group has made a number of key recommendations including intergenerational information exchange through programs with local schools, focused science and technology development to reduce the costs of stewardship, and maintenance/monitoring of institutional controls. The working group has provided support to DOE in communicating with local government, schools, and other citizens.

Lessons learned from these activities include the need for early and continued involvement of the public in development of stewardship policy and planning. In addition, the Oak Ridge public proved to be an unexpected resource in providing interest, energy, and time for stewardship planning. Their participation extended the limited available resources and allowed the DOE Oak Ridge Operations Office to become a leader in Stewardship planning.

Ralph Skinner, Jr. interfaces with site regulators, civic governments, other Oak Ridge program offices, a very active Site Specific Advisory Board and other public groups, and manages contractor activity in the stewardship area. He previously served as Team Leader for the ORNL Melton Valley remedial action program, helping negotiate a CERCLA Record of Decision addressing over 200 release sites, scheduled for completion in approximately 2015, with a budget of approximately $165 million. Prior to his responsibilities in environmental restoration, Mr. Skinner served as Branch Chief for the Oak Ridge Waste Management program and Program Manager for Waste Management line item construction. Mr. Skinner has been with DOE since 1992, and previously served with the Tennessee Valley Authority as a design engineer in various capacities for 14 years. He has a bachelors degree in engineering from the University of Alabama.

Session XVIII

Regulator/Stakeholder Panel Session

Brian Hennessey, U.S. Department of Energy, Savannah River Operation Office

Working in a teaming environment with regulators and stakeholders from the inception of a remediation project through completion improves efficiency and accelerates the regulatory approval process. Input is sought on regulator and stakeholder project involvement, on topics such as streamlining operations, acceptance of innovative technologies, and public involvement methods that improve decision-making.

Multi-Dimensional Perspectives for Communicating Data - Communicating Environmental Data to the General Community

Daryl Green and Teresa Perry, U.S. Department of Energy, Oak Ridge Operations Office

The goal of this paper is to give individuals within the government system techniques to communicate the large amount of environmental data to the Department of Energy's many customers, several who are nontechnical people. America requires the Department of Energy (DOE) to become more results-driven. The changing environment of today has caused many organizations to find faster, cost-effective ways to provide services to the public. Being able to apply some basic marketing concepts is critical to communicating effectively and understanding the customers' wants and needs. According to the National Research Council report, Innovations in Ground Water and Soil Cleanup, companies founded on marketing new environmental remediation technologies have fared poorly despite the billions of dollars being spent on environmental cleanup each year. Communicating the message to the right customer is critical in deploying any new technologies. One must also make the decision on what data needs to be collected and how it is to be presented to these customers. Unfortunately, many DOE scientists and engineers have not had any exposure to marketing. Marketing and technology developments are important functions of any business system aimed at providing customers the resources they need. The right communication tools work because potential end-users will readily recognize if the technology provider understands their needs and what benefits are achievable.

When information is transferred properly, projects are successful. The mistake that many organizations make is placing a higher emphasis on the project than on communicating with the customers or stakeholders. After 50 years of production of nuclear weapons, America is still left with the problems of solving the many environmental problems of the past. Everyone has a stake in this problem—taxpayers, local, state, and federal entities, environmental groups, elected officials, and other stakeholders.

According to DOE's Strategic Plan, there is an increasing inventory of spent fuel from commercial nuclear reactor stored in 33 States. DOE plans to complete cleanup at 21 of the remaining 42 sites by 2006. The new strategy requires a project approach to complete all 353 projects at DOE's 53 remaining cleanup sites. A review of 37 Environmental Management (EM) cleanup projects, representing an estimated life-cycle cost of $33 billion, has identified more than 80 opportunities to exceed EM's performance goals. With a potential savings for those 37 projects of $4 billion, innovative and emerging technology will play a key role in achieving these cost savings. How do you convey these technical problems to non-DOE individuals?

Many times DOE develops solutions without the customer in mind. This paper will highlight how to convey detailed data and project information using visual and computer-based tools, customize the level of data detail for the audience and end-users, and select the right communication tools for the project.

Daryl D. Green, MA, works for DOE as technology development manager, reviewing new and emerging technologies for the environmental clean up. His duties include overseeing the DOE programs in Oak Ridge relating to robotics, characterization, and deactivation and decommission. Mr. Green has provided leadership for the two most visible D&D projects in Oak Ridge, the K-25 Site Powerhouse Demolition Project and Cooling Tower Demolition Project. His past experience includes managing over 400 projects estimated at $100 million before he was 30. He has worked with every major DOE program which include Environmental Management, Energy Research, Energy Efficiency, Environmental and Health to name a few. He has been involved with safety and health, research and development, work-for-others, technology development, technology transfer, privatization, and budget since he first came to DOE. He is a nationally syndicated columnist and the author of two books, My Cup Runneth Over and Awakening the Talents Within. He also owns a consulting firm where he does marketing to potential customers. Daryl teaches classes on marketing trends at colleges and professional conferences. He is a manager, entrepreneur, artist, marketer, poet, TV producer, personal advisor, professor, and author. These experiences provide him with a very unique position of understanding emerging trends. Daryl received a B.S. in Mechanical Engineering at Southern University A&M and a MA in Organizational Management at Tusculum College.

Stakeholder Involvement in Long-Term Stewardship through Systems Dynamics and Group Model Building

Jacob J. Jacobson, Idaho National Engineering and Environmenta Laboratory

A long-term stewardship plan is required to maintain an adequate level of protection to human health and the environment. The use of System Dynamics and Group Modeling can provide creative and unique options for long-term stewardship. The use of System Dynamics can help a diverse group of stakeholders understand the complex dynamic interactions of the different elements of the ecosystems involved in long-term stewardship. Models developed through a group activity allow testing of various management scenarios to help determine the impacts of important factors such as land use changes on the long-term security of surrounding environments.

The INEEL, using the System Dynamics simulation approach and working collaboratively with the private sector, has developed an approach that has been successfully applied in both the food processing and aluminum industries. The approach begins by using Group Modeling Software to streamline the initial brain-storming sessions where the elements and ideas important to the stakeholders and relevant to long-term stewardship are posed to the group. The interactions between the different elements are derived and a basic System Dynamics model is developed. The stakeholders are then able to test various long-term stewardship scenarios and determine the results on the local ecosystems.

Jacob Jacobson has over 17 years experience consulting in the scientific research field. He is the lead developer of multi-scenario, multi-attribute simulation software that addresses environmental sustainability issues using the latest in software development tools and system dynamics applications. He was trained in System Dynamics through the Sloan School of Management at the Massachusetts Institute of Technology.

Stakeholder Involvement in Development of Budget Request

Kevin J. Rohrer, U.S. Department of Energy Nevada, Office of Environmental Management

The Department of Energy (DOE), Nevada Operations Office has taken an innovative approach in working with local stakeholders to gain input in development of its Environmental Management (EM) fiscal year 2002 budget request. By teaming with the Community Advisory Board and working with its local regulator, two interactive workshops helped to explain program activities and develop an integrated budget priority lists of activities. These priority lists became the basis of the EM budget request.

The workshops were developed based on lessons learned from previous year's workshops. To broaden participation, two identical workshops were held. Timing of the workshops was critical to get input before significant development of the local budget request. The workshops were designed to allow for increased interactions among the public, the regulator, and DOE project managers. The two key components leading to the success of the workshop were informal discussions among all parties and an "investment game" played by participants. Stakeholders noted that they got more out of the informal discussions than any other DOE presentation they have ever heard. They also expressed a sense of ownership of the results because they took part in spending $75 million of their tax dollars as part of the investment game. The Community Advisory Board played a key role in leading informal discussions based on the knowledge they have gained over the years of tracking the various projects. Board members were viewed as opinion leaders and trusted information sources by the general public which in turn lead to the enhanced credibility of the DOE Nevada programs.

Key lessons learned include: 1) involve stakeholders in the planning, 2) continuously incorporate feedback, 3) engage stakeholders early, and, 4) demonstrate how input influences decision process.

Kevin J. Rohrer is Public Participation Manager for the Nevada Operations Office, Office of Environmental Management. He is responsible for interpreting and implementing headquarters' public participation policy and for coordinating DOE's relationship with the Community Advisory Board. Mr. Rohrer earned an M.A. in Business and Organizational Communications and a B.B.A. in Marketing.

Public Involvement Challenges Ahead for the INEEL Environmental Restoration Program

Erik Simpson, Idaho National Engineering and Environmental Laboratory

The Idaho National Engineering and Environmental Laboratory (INEEL) faced a public involvement challenge recently when it applied for air quality permits to construct an onsite incinerator for treating transuranic-contaminated wastes. Although there was little opposition in Idaho, many Jackson, Wyoming, residents were adamantly opposed to the project. As a result, DOE put the incinerator on hold, but will move ahead with plans to build a $500 million waste treatment facility. This experience reaffirmed the importance of early and effective public involvement. Some of the more vocal activists have said they intend to set their sights on upcoming, high-visibility environmental restoration projects. This presentation will discuss what was learned from the experience and how the INEEL Environmental Restoration Program intends to satisfy the information needs of activist groups and the general public on upcoming cleanup projects. These projects will address buried transuranic wastes, contamination present in one of the largest aquifers in the U.S., and the construction of a contaminated soil repository over the aquifer.

Erik Simpson earned a Bachelor of Science Degree in Technical Writing from the University of Idaho in 1988. He has been with the INEEL Environmental Restoration Program Community Relations Office since 1991 and has held the Community Relations Plan Coordinator position since 1997.

Use of the Internet to Effectively Communicate with Stakeholders

Helen Stolz and Ralph Smiecinski, PAI/DOE/NV

In 1995, the Site Technology Coordinationg Group at DOE/NV, developed a website for communicating with DOE/HQ, other DOE sites, vendors, contractors, regulators, and the public. Stakeholder involvement had become a big issue at DOE and most sites were trying various ways to communicate and involve stakeholders in what was happening at their sites pertaining to clean up activities and restoring the land that was once used for nuclear testing purposes. Our intention was to distribute real-time information to a larger group of stakeholders which would be less expensive, less time consuming, provide for one-stop-shopping, and accelerate schedule. The internet would be the appropriate avenue for this mode of communication. Information provided would be publications, calendar of events for meetings and workshops, points-of-contact, fact sheets, demonstrations/deployment activities, etc.

Nevada is a small site that has a minimal budget so it is limited in the amount of money that could be spent on developing a website. This issue along with personnel problems, procedures developed by the Office of Public Affairs concerning what could be put on a website, time constraints, and who would be responsible for creating and developing the site, were not understood when the project began. We felt we had an available internet resource for all to use to disseminate information and we jumped on the band wagon without completely understanding the process. We have since discovered that the first thing we should have done was develop a plan so we would have known what we wanted to accomplish and by when.

Some points to ponder in the development of the website include:

Who is the intended audience?

What resources are available to help in the development stages?

What procedures need to be followed?

Should there be opportunity for stakeholder feedback; and to whom?

What types of information do you want put on the site; videos, pictures, hyperlinks, points-of-contact, etc.?

What is the time frame?

The presentation will include a discussion of an implementation plan to produce a website for dissemination of technology information/activities for environment management at a small DOE site. “Lessons learned” will also be highlighted for use by other interested parties.

Helen Stolz, Professional Analysis, Inc., STCG Coordinator for DOE/NV. Helen is responsible for the day-to-day activities of the STCG and for coordinating all STCG technology activities between the DOE/NV Technology, Waste Management, and Environmental Restoration Divisions. Helen also provides support to the TPO and is the IPABS point of contact for the Technology Division activities.

Session XIX

Emerging Waste Management Practices Panel Session

Mildred Keith, U.S. Department of Energy, Savannah River Operation Office

Completion of Transuranic Waste Drum Retrieval and Venting Operations at Savannah River Site

Michael E. Brennan, Solid Waste Division, Westinghouse Savannah River Company

The Solid Waste Division completed the Transuranic Waste Retrieval Project in August 1999 reducing risks associated with retrievably stored Transuranic Waste under earthen mounds. The project retrieved 8800 drums placed in storage between 1976 and 1986. This was the first project of this type completed in the DOE complex. The drums had an expected life of 20 years, contained transuranic and RCRA hazardous waste, and were not vented. The retrieval process included soil sampling and removal, drum retrieval, and radiological surveys. The drums were inspected, cleaned, labeled, vented, and purged. The vent and purge equipment safely penetrated the drums with potentially explosive headspace gases, obtained and analyzed headspace gases, and purged the drums as necessary. Then drums were banded, palletized, and placed in storage on covered concrete pads. The project team used a graded approach to analyzed risks, develop procedures, and complete the work. The project was completed two years ahead of schedule at a cost 40% less than the original forecasted budget. Close communications with the state and federal regulators, DOE customers, and the local Citizen Advisory Board throughout resulted in continued support for the project. This will present the project history, lessons learned, the applicability to similar DOE projects, and the benefits and risks associated with using the graded approach while complying with the multiple regulations and requirements.

Michael E. Brennan has over twenty years experience managing projects for the treatment and disposal of TRU, mixed, or low level waste in both DOE and commercial nuclear power. For ten years Mr. Brennan was involved in waste management at SRS. The remainder at numerous nuclear power plants in outage related projects. Mr. Brennan has a BS in Electrical Engineering from West Virginia University.

Emerging Remediation Treatment for Organics and TRU

Larry McNamara and Dr. Louis Centofanti, Perma-Fix Environmental Services, Inc.

Perma-Fix Technology Advances, Permit Modifications, and Acquisitions: Impact on the Inventory of Mixed Waste Organics. Perma-Fix Environmental Services, Inc., is in the sixth year of a planned program enhancing it's ability to process a variety of mixed radioactive wastes with organic contaminants in their mixed waste facility in Gainesville, Florida. This program has included research and development into simple, successful treatment methods for solid and sludge mixed waste matrices contaminated with a variety of Organics, including volatiles and PCBs. Established to allow remote operation these processes are well suited to both on and offsite treatment of TRU and high level waste streams. This ability to address TRU/high level mixed waste containing volatile organics as an alternative to incineration allows generators an available alternative to their toughest waste problems.

Recent advancements in this program include the ability to produce free release distillate and the purchase of the Diversified Scientific Services, Inc. (DSSI) permitted mixed waste industrial boiler. The acquisition of DSSI, always an element in our program, has provided additional opportunities to incorporate Perma-Fix's conventional experience in fuel blending to extend the range of materials qualifying for acceptance at that facility. This allows us to marry the DSSI facility with our new organic processing capacity in Gainesville.

These elements combine to give Perma-Fix the ability to have a major impact on the existing and projected inventory of untreated and previously untreatable mixed waste organic liquids, solids, and sludges.

Louis Centofanti, is President of Perma-Fix Environmental Services. Dr. Centofanti, a former DOE Regional Administrator under the Carter administration and nationally known expert in waste treatment technologies, has a Ph.D. and M.S. in chemistry from the University of Michigan and a B.S. from Youngstown State university. Dr Centofanti holds several patents related to waste treatment and has been involved with commercializing technologies for over twenty years. Larry McNamara is the Vice President Federal programs at Perma-Fix Environmental Services. Mr. McNamara is the former head of the Department of Defense Low Level radioactive waste disposal office. He has served on various National policy Committees and advisory committees.

Application of Lessons Learned in Assuring Future Success of the ORR EMWMF

J. Pat Hopper and Paul Corpstein, Waste Management Federal Services; Joe Williams, Bechtel Jacobs Company, LLC

Bechtel Jacobs Company, LLC (BJC) is the Management & Integration contractor to DOE's Oak Ridge Operations. GTS Duratek is under subcontract to BJC to perform the design, construction, operations and closure of the Environmental Management Waste Management Facility (EMWMF) on the Oak Ridge Reservation (ORR). The EMWMF is an on-site disposal facility, which will accept for disposal radioactive, hazardous, toxic, and mixed waste generated by remedial action subcontractors under separate subcontracts to BJC. Currently, the EMWMF Project is completing the design and preparing for construction in early 2001. The EMWMF is the centerpiece in the DOE's strategy for ORR environmental cleanup.

The following important activities have been acomplished since the 1995 inception of this project and were the source of lessons learned as described herein:

- Acceptance of the conceptual approach by regulators as an integral solution to overall ORR cleanup.
- Development of a Remedial Investigation to identify a site and to determine waste streams and volumes.
- Perform Feasibility Studies to develop the conceptual design, confirm the viability of the on-site disposal option, and define the environmental risk represented by the on-site disposal versus off-site disposal.
- An active CERCLA public participation process to define cleanup priorities, establish future land uses, and confirm that managing ORR waste on-site was an accepted responsibility.
- Development and approval of a Record of Decision and approval of the Report to Congress.
- Two part competitive bidding for award of the design, construction, operations and closure subcontract.

Lessons Learned from accomplishments:

- Engage regulators early and keep them informed during process. Provide a stakeholder atmosphere/relationship as early since they steward the state's and country's environment.
- Well conceived front end site development can result in a more defensible, regulatorily acceptable site. Don't let politics pick the site, use sound, unbiased science and tailor the site to the wastes' volume concentration characteristics, and realistic future land uses.
- Perform a risk assessment and establish acceptable and manageable risk and then provide a design that has flexibility and reasonable factors of safety relative to the risk.
- Involve public early to ensure they perceive ownership of the process and decisions. Always be honest and sincere, which may mean keeping the PR "suits" at home and letting the "pocket protector" scientists discuss the details with them.
- Plan the process and incorporate into your plans the following eventualities: it will take longer than you want and there will be last minute crises.
- Select the bidder who takes your conceptual approach and improves it and still has the lowest cost. Look for direct experience rather than big bottom lines. Do not micro-manage the creartive subcontractor.

Pat Hopper is Vice President, Eastern Operations for Waste Management Federal Services, Inc. (WMFS). Mr. Hopper has nearly 30 years experience managing large multi-discipline nuclear projects and facility operations for both government and private industry. He presently manages development projects and operations projects at federal facilities in the eastern United States. These projects encompass low-level radioactive waste, high level radioactive waste, hazardous waste, mixed waste and solid waste.

Waste Maximinzation

Kenneth M. Grumski, MHF Logistical Solutions Inc.

There are many variables in the equation for the site decommissioning process that the Department of Energy (DOE) Complexes have dissected in the attempt to reduce costs. Cost reduction and cost management are the major conditions for site decommissioning to become more feasible in the future. In order for costs to be reduced without sacrificing quality or safety, business must shift to a new generation of rationalization in all aspects of the process.

One shift that has produced significant cost savings is waste maximization. How's that? Maximization? Maximize through packaging and transportation. Packaging and transportation are variables that can be maximized to significantly reduce costs.

Recently, in the past four years, unique technical and "turnkey" transportation logistical processes have been developed to move large and small quantities of bulk or packaged low level waste via rail and truck transport. Rail transportation offers material movement of a larger dimension and quantity as opposed to traditional methods. The maximization concept is to move material in specialized equipment utilizing truck, rail, and marine transport verses small packages transported only by trucks.

The benefit of maximizing movement of decommissioning waste not only lowers direct cost of packaging and transportation, but, is reflected upstream as well. Some of the upstream benefits are less material size reduction, less handling of waste and containers, greater ALARA benefits, and lower transportation risks. Properly applying the most efficient means of transportation and package selection can reduce direct transportation costs up to 50% or more.

These unique maximization techniques are implemented by waste stream project specific planning, container design, container usage, railcar usage and transportation logistics. Applying these elements to the equation further maximize the cost saving effort for decommissioning.

Kenneth Grumski offers MHF Logistical Solutions Inc. nine years of a variety of Quality Assurance experience in container design, container manufacturing, hazardous waste processing, hazardous waste management, and transportation of hazardous materials. He possesses the ability to implement customer oriented quality systems and provide effectual leadership to produce successful project results in a demanding customer environment. Mr. Grumski provides a unique blend of QA experience to the customer base in that he has acquired commercial nuclear and Department of Energy (DOE) experience through managing Quality Assurance programs in accordance with NQA-1; 10CFR50, Appendix B; 10CFR71, Subpart H; 10CFR72, Subpart G requirements; and DOE order 5700.6C and 10 CFR 830.120. He also was involved in approving design, test and implementation of NRC licensed containers, type A, B, and "strong tight" packages.

Disposition of Nuclear Weapon Components Generated by Remedial Activities

Bob Galloway and Paula J. Slavin, SNL/NM Dept. 6133

The Sandia National Laboratories/New Mexico (SNL/NM) Environmental Restoration Project completed excavation of the Technical Area II Classified Waste Landfill in February 2000. The remaining challenge is arranging for the disposition of the material excavated. Aggressive recycling and waste minimization efforts are being implemented to reduce waste disposal costs.

While a few classified components are reclaimed for museum pieces or training purposes, the bulk of the material excavated must be demilitarized before disposition by recycling or waste disposal. Disposal of the material as classified waste is not attractive because of the complexity of the material and the lack of approved disposal sites. The high cost and/or complexity of disposal promote recycling and waste minimization efforts. The challenges include determining demilitarization procedures for both contaminated and uncontaminated classified components, complying with security requirements, verifying whether demilitarized metals can be radiologically free-released, and finding disposal options for the waste generated.

The demilitarization process consists of identification and extensive sorting; disassembly to remove unclassified, hazardous, and/or radioactive parts; then shredding, cutting, sawing, or melting the remaining components prior to metals recovery. The high-quality electronic components contain attractive quantities of precious metals, and the weapon mock-ups and prototypes produce significant amounts of more common metals.

This work was supported by the United States Department of Energy under contract DE-AC04-94AL85000. Sandia is a multiprogram laboratory operated by Sandia Corporation, a Lockheed Martin Company, for the United States Department of Energy.

Bob Galloway is an engineer supporting SNL/NM's Environmental Restoration Project on various assignments since 1992. Paula Slavin is a geologist with GRAM, Inc. supporting SNL/NM's Environmental Restoration Project on various assignments since 1992.

Chemical Reactions in Liquids Induced by High Frequency Electric Fields

Alexander Babchin; Jian-Yang Yuan; Haibo Huang; Richard McFarlane; and Eddy Isaacs, Alberta Research Council

A prototype of chemical reactor using radio frequency electric field at dielectric breakdown conditions was built and tested under ambient conditions. The initial reactants were in liquid form (mostly hydrocarbon mixtures). New products were obtained in the form of lighter hydrocarbons, mostly in gaseous form and carbonaceous particles. While the average temperature of the cell during the reactions did not increase significantly, the local temperature within dielectric breakdown zone was estimated as high as 4000C. Most of the energy was consumed by endothermic reactions. Even such stable hydrocarbons as tetralin can undergo chemical changes. This reactor provides a possible application for the destruction of toxic liquid materials.

Alexander Babchin is Alberta Research Council's Distinguished Scientist. He holds a Ph.D. degree in chemical engineering, Moscow, and has over 30 years of industrial and academic experience. Dr. Babchin's field of expertise includes colloid and interface sciense, multiphase flow, interaction of complex fluids with electromagnetic and acoustic fields, and heavy oil and oil sand production technologies. He has over 70 publications and patents in the field of his expertise.

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Session XX

Ground Water Panel Session

Chet Miller, U.S. Department of Energy, Headquarters

Many current technologies for contaminated ground water characterization, containment, and treatment are ineffective or too costly. Abstracts are requested that highlight cost effective sampling, monitoring, and innovative treatment technologies for ground water.

A Strategic Approach for Deploying Bioremediation at DOE Oak Ridge for Treatment of DNAPL in Fracture Bedrock and CCl4 in Ground Water

Michael A. Krstich; Dale Pflug; Mike Kelly; Janice Hensley; and Tony Manion, EMS - TechCon

A Technical Advisory Group (TAG) headed by ITRD and TechCon has been evaluating bioremediation treatment for ground water and fractured bedrock at the Department of Energy (DOE) Oak Ridge Reservation (ORR). The ground water in the Upper East Fork Poplar Creek (UEFPC) watershed, which is part of the Y-12 Plant installation, contains carbon tetrachloride (CCl4) in quantities greater than permitted by Environmental Protection Agency (EPA) regulations for drinking-water sources. The source of the CCl4 is considered to originate from the dense non-aqueous phase liquids (DNAPLs) contained in the fractured bedrock underlying an area of the Y-12 Plant.

The approach taken by the TAG over the past year has focused on biostimulation and bioaugmentation treatability studies for CCl4 in ground water and modeling of ground water parameters. Successful results for the treatability studies have led the project team to deploy pilot-scale bioremediation of the CCl4 plume in FY-2001 to enhance current pump and treat remediation efforts. This paper describes current activities undertaken by the TAG for developing a biostimulation conceptual design that draws upon additional ground water modeling and characterization initiatives.

Michael Krstich is President of EMS. Dale Pflug is program manager for the TechCon program at ANL. Mike Kelly is a project manager for the ITRD program. Janice Hensley is a project manager for Bechtel- Jacobs at Oak Ridge. Tony Manion is project manager for DOE at Oak Ridge.

Phytoremediation Identified as Cost Effective, Preferred Technology At Monument Valley, Arizona, UMTRA Ground Water Site

Ken Karp; MACTEC-ERS -DOE Grand Junction Office

Surficial ground water beneath the Monument Valley, Arizona, UMTRA Ground Water site, located on Navajo Nation land, was contaminated by former uranium ore-processing operations that were ongoing from 1955 through 1968. Tailings piles, leach areas, an evaporation pond, and other associated contaminated surface materials were removed from the site by January 1994, in accordance with 40 CFR Part 192 Subpart A as part of the U.S. Department of Energy (DOE) Uranium Mill Tailings Remedial Action (UMTRA) surface project. However, the surficial aquifer down gradient from the former mill site remains contaminated with nitrate concentrations that exceed the U.S. DOE ground water standard of 44 milligrams per liter (mg/L). Concentrations of nitrate are observed exceeding 1200 mg/L. In addition, sulfate concentrations exceed the Navajo Nation cleanup goal of 250 mg/L.

A detailed alternative evaluation of four potential active treatment technologies for remediation of nitrate and sulfate contamination in the aquifer was prepared to develop the most cost-effective strategy that complies with the U.S. Environmental Protection Agency (EPA) ground water standards and protects human health and the environment. Optimization modeling was used to design the remedial extraction system. Two pumping strategies were identified, a consumptive use strategy that does not return treated water to the aquifer, and a non-consumptive use strategy that returns treated water to the aquifer. Two consumptive use treatment technologies, phytoremediation and spray evaporation, and two non-consumptiveuse technologies, distillation and ion exchange were evaluated.

Phytoremediation was identified as the preferred technology which incorporates passive phytoremediation of subpile soils located in the former source area, enhances the existing natural phytoremediation from black greasewood stands near the source area, and combines a comsumptive use pumping strategy with land farming for active remediation of the surficial aquifer. The phytoremediation will meet the project treatment standards and goals at a significant cost advantage over the other active treatment technologies evaluated.

Kenneth Karp is a geologist with over 19 years experience in environmental characterization, assessment, and remediation. He is currently a project manager responsible for multiple ground water restoration projects.

Economical and Reusable Ground Water Treatment Solutions Developed at LLNL

Robert W. Bainer; Edwin Folsom; Larry Kita; and Roberto Ruiz, Lawrence Livermore National Laboratory

Ground water cleanup traditionally relied on large permanent treatment facilities. At Lawrence Livermore National Laboratory (LLNL), we developed treatment units that are smaller, portable, and more economical. These treatment units are easily relocated and used at other locations requiring ground water treatment. The selection and cost for treatment facilities for volatile organic compounds (VOCs) is site specific. The application of each type of facility is determined primarily by the amount of ground water flow and contaminant concentration.

Four types of portable ground water treatment units are in use at LLNL. These include portable treatment units (PTUs), miniature treatment units (MTUs), granular activated-carbon treatment units (GTUs), and solar-powered treatment units (STUs). Each of these facilities are easily relocated with a forklift. Twenty one facilities are currently in use with approximately 24 additional units planned.

The phased implementation of treatment allows optimal placement of extraction wells and PTUs. As the plumes are remediated, the PTUs can be moved to other locations or replaced with a more economical unit.

LLNL has developed PTUs based on air stripping and aqueous phase carbon. This same technique can be used for other ground water contaminants using secondary treatment by ion exchange, biological or phytoremediation.

Work performed under the auspices of the U.S. Department of Energy by Lawrence Livermore National Laboratory under Contract W-7405-Eng-48.

Robert W. Bainer is the Site Project Leader for environmental restoration at Lawrence Livermore National Laboratory. He has twenty six years of diversified geotechnical, managerial, and research experience in the fields of seismic reflection and refraction, minerals, oil, gas, and geothermal exploration, environmental restoration, and electrical methods of interpreting subsurface conditions.

Aerobic Non-toxic Cometabolism of Trichloroethylene in Ground Water: A Case Study

Robert S. Donofrio, M.S., BioRemedial Technologies, Incorporated and Ronald M. Seech, MLT (ASCP)

BioRemedial Technologies, Incorporated has implemented a ground water treatment system utilizing a non-toxic cometabolite, Compound C, for the aerobic removal of trichloroethylene in ground water. Phase II and Phase III studies on ground water and soil located underneath a RCRA 90-day drum storage pad at a welding consumables plant in Ashtabula, Ohio, indicated the presence of various chlorinated organics. The site was found to contain high levels of trichloroethylene (27 ppm in ground water and up to 600 mg / kg in soil) and lesser concentrations of tetrachloroethylene, cis-1,2-dichloroethylene, and vinyl chloride. The approximate area of affected soil and ground water is 50,000 ft2 and includes an extension of the contaminated plume downgradient from the source (pad) area. The soils possess an average horizontal ground water flow velocity of less than 1 ft / yr. Site treatment began in October 1999 upon acceptance of a Voluntary Closure Plan of a RCRA unit, which met the Closure Performance Standard of Ohio Administrative Code 3745-66-11. Trichloroethylene concentrations in three of the four monitoring wells have been reduced by greater than 90% during the first two quarters of system operation. An overall cost savings in excess of $1,000,000 is estimated by the client when comparing the biological treatment system to other remediation / disposal technologies.

BioRemedial Technologies, Incorporated (BRT) specializes in the application of innovative biological technologies to address environmental contamination issues. BRT was founded in 1993 as an offshoot of interest in utilizing microorganisms in coal desulfurization. Today, BRT's project list includes feasibility and treatability testing, industrial waste stream treatment, and ex situ and in situ remediation of soil and groundwater.

Operation Status of Reactive Barriers at Rocky Flats Environmental Technology Site

Annette Primrose; Lane Butler; and Norma Castaneda, Kaiser Hill/Rocky Flats Environmental Technology Site

Three reactive barriers are operating at the Rocky Flats Environmental Technology Site. These simple, passive intercept and treatment systems protect surface water and treat contaminated ground water to levels consistent with unrestricted discharge. The systems are installed near the distal ends of the plumes to intercept groundwater prior to entering surface water and are effective in low flow, low permeability regimes.

A 220 foot-long system was installed in 1998 to collect and treat ground water contaminated with Volatile Organic Compounds (VOCs) and low levels of uranium and americium. Based on the success of this system, a 1,200-foot ground water collection system was installed in 1999 to treat VOC contaminated ground water. In addition, a 1,100 foot-long system was installed to collect and treat ground water contaminated with low levels of nitrate and uranium.

Reactive iron is used to effectively treat both VOC and radiological-contaminated ground water. Sufficient data are available to demonstrate the effectiveness of both systems. Sawdust and iron are used to treat the nitrate and uranium contaminated ground water.

Annette Primrose is the Project Manager for installation of the ground water reactive barriers at Rocky Flats Environmental Technology Site.

Removing Uranium From Contaminated Groundwater At Fernald Using Ion Exchange Technology

Chris Sutton, Ph.D., Cathy Glassmeyer, and Steve Bozich, Fluor Fernald, Inc.

Using pump and treat methodology, uranium contaminated groundwater is being removed from the Great Miami Aquifer at DOE's Fernald, OH (FEMP, Fernald Environmental Management Project) site per the FEMP's Record of Decision (ROD) which defines cleanup. Standard extraction wells pump about 3900 gallons per minute (gpm) from the aquifer through five ion exchange treatment systems. The largest treatment system is the Advanced Wastewater Treatment (AWWT) Expansion System with a capacity of 1800 gpm, which consists of three trains of two vessels. The trains operate in parallel treating 600 gpm each. The two vessels in each train operate in series, one in lead and one in lag. Treated groundwater is either reinjected back into the aquifer to speed up the aquifer cleanup process or discharged to the Great Miami River. The uranium regulatory ROD limit for discharge to the river is 20 parts per billion (ppb), and the uranium administrative action level for reinjection is 10 ppb.

To effectively manage the ion exchange treatment process a three-fold approach has been initiated at Fernald:

- Daily uranium monitoring of influent and effluent streams from each treatment vessel,
- Routine determination of resin loading and forecasting of effluent uranium concentration based upon resin loading, and
- Implementation of a regular regeneration schedule for the AWWT expansion system wherein each vessel is planned to be regenerated once per year with those regenerations staged throughout the year.

At the outset of this three-fold approach, considerable uncertainty existed as to whether a spent resin could be regenerated successfully enough so that it performed as well as new resin relative to achieving very low uranium concentrations in the effluent. A second major uncertainty was whether the operational lifetime of a regenerated resin would be similar to that of a new resin with respect to uranium loading capacity and effluent concentration behavior. The three-fold approach has allowed Fernald to characterize and manage those uncertainties, thereby ensuring a relatively constant, low uranium concentration in both reinjection and discharge waters.

Chris Sutton earned a B.S. in chemistry, a M.S. in chemistry, and his Ph.D. in oceanography. He has worked on many projects both nationally and internationally in the petroleum, analytical instrumentation, and environmental remediation industries. Currently, Dr. Sutton serves as Senior Technical Expert for Fluor Fernald, Inc.

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Session XXI

SRS Facility Disposition Program Session

Angela Adams, U.S. Department of Energy, Savannah River Operations Office and Andrew Szilagyi, U.S. Department of Energy, Headquarters

The session will include presentations on all aspects of the Facility Disposition Program at Savannah River, including: Facility Transition, Surveillance & Maintenance, Risk Management, Deactivation, Decision Analyses, Decommissioning, Use of Advanced Technologies, and Long Range Planning Tools. Presentations will focus on how each aspect of the program is geared toward Reducing Cost and/or Reducing Risk in Inactive Facilities.

How to Succeed on a Fixed Budget

David Yannitell, Westinghouse Savannah River Company, LLC

The Facilities Disposition Division (FDD) is the BWXT Division of the Westinghouse Savannah River Company, L.L.C. (WSRC), responsible for managing the site's Surplus Facility Disposition Program. While the number of surplus facilities is growing, the budget for disposition of these facilities is remaining essentially constant. This presentation will summarize the Savannah River Site (SRS) facility disposition program and the various elements of the program employed by FDD to provide effective management of the increasing number of surplus facilities on a constant budget. The presentation will also serve as an introduction to the other papers to be presented at the SRS Facilities Disposition Session of the TIE Conference.

FDD's Facilities Disposition Program includes the following basic elements:

- **Transition of excess facilities into the Disposition Program** Facilities no longer required for their original mission are shutdown and transferred to FDD in accordance with a formalized procedure, consistent with the LCAM Facility Transition Guidance.
- **A Requirements Based Surveillance and Maintenance Assessment Program** The Surveillance and Mainteance (S&M) Programs for facilities in the Disposition Program are reviewed against source level requirements to ensure only appropriate activities are included.
- **An Inactive Facilities Risk Management Program** A program developed and managed by FDD inspects, evaluates, prioritizes and takes action to reduce risks in site inactive facilities. The program utilizes limited resources to reduce the highest risks regardless of the facilities in which they are located.
- **Deactivation Projects** Deactivation Projects are conducted to place facilities in a condition that reduces risk to site workers, the public, and the environment while minimizing the cost to maintain them in a safe condition.
- **Decommissioning using unneeded Government Assets** FDD has instituted an Assets-for-Services Program that utilizes unneeded government property to compensate subcontractors for performance of decommissioning services.
- **A Facility Disposition Technology Development and Deployment Program** FDD operates the site's Decontamination Facility and has a proactive program to continually evaluate and implement state-of-the-art technologies to improve the cost effectiveness of disposition program activities.
- **A Standardized Long Range Facilities Disposition Planning Process** FDD recently developed and implemented a standardized process for planning long-range facility disposition activities. The program is being refined and has been proposed for use at other DOE sites.

Dave Yannitell is a Program Manager in the Facilities Decommissioning Division at DOE's Savannah River Site in South Carolina. After receiving his BS Degree in Naval Architecture and Marine Engineering at Webb Institute, Mr. Yannitell spent his career in the nuclear business, most of which included D&D or related maintenance activities. At the Naval Reactor's Knolls Atomic Power Laboratory, he managed nuclear plant operations, training, maintenance and both field and design engineering activities. Mr. Yannitell was responsible for engineering and operations at the Shippingport Decommissioning Project. Many of the now standard engineering approaches to decommissioning were developed during this project. Mr. Yannitell has subsequently provided management and technical direction for DOE D&D programs at Savannah River, Oak Ridge, Hanford, Mound, Fernald, Brookhaven, Argonne, Princeton University, and at the RMI Decommissioning Project.

Facility Transition Process at SRS

Richard Garniewicz, Westinghouse Savannah River Company, LLC

Too often, there is little to no systematic planning for the safe shutdown of a facility when the mission has been completed. The Facility Transition Process outlines how to bridge the gap as facilities shift from operational to disposition life cycle phases.

Unlike other DOE sites, the majority of the facilities at the Savannah River Site have already been transitioned to Environmental Management's Programmatic Office. The Site's Partnering Contractor has developed a procedure manual [WSRC 1C Facility Disposition Manual] that outlines the disposition process. The "Transition from Operations" Procedures 201 defines and outlines actions required to retire these excess facilities from service, shutting them down safely and transferring custodial responsibilities to the Facilities Disposition Division.

The presentation will highlight:

1. Requirements, actions, issues, and concerns of implementing the Savannah River Site (SRS) site disposition procedures.
2. Lessons Learned on transition of facilities prior to and after institutionalizing the transfer process at SRS.
3. Comparison of the SRS Divisional transfer process to the LCAM Guide process for transfer between HQ Divisions.
4. A status update and future outlook into the impacts of the Transition Program and impacts on the Out-Year budgets will be reviewed.

Richard Garniewicz, with degrees in Nuclear Engineering and Business Management, is currently employed with WSRC and has more than 30 years of working experience at commercial nuclear and DOE facilities. Prior to employment at SRS, Mr. Garniewicz worked for a leading manufacturing company of specialized radio-chemicals in the Boston Area. This work experience included installation, operation and maintenance of four cyclotrons, and developmental work in target preparations. In addition, Mr. Garniewicz was responsible for the manufacture of radioactive sources with industrial, research and medical applications. At SRS, he has had a variety of assignments including: Project Installations and Start-ups at the SR Chemical Processing Facilities; Operations Manager for the plutonium-238 finishing plant; Program Manager in several divisions and is currently working in the; and Engineering Department for the Facilities Disposition Division.

Reducing Cost of Surveillance and Maintenance (S&M) Programs

Caroline Bruns, Westinghouse Savannah River Company, LLC

As budget reductions in the government programs are made, determining whether cost/resource reallocation can be realized is an essential component in out-year planning. A significant portion of support costs is expended on surveillance and maintenance (S&M) of facilities. A systematic evaluation of S&M activities against requirements, and then identifying potential improvements in cost and schedule can reduce or eliminate efforts expended on non-value added activities. These improvements can be directed towards other mission-related activities.

A three-step process was established as a path to the final goal. The first step consisted of a screening process to identify general areas that posed a potential for requiring surveillance and/or maintenance over the storage period and those specific systems, structures, or components that would be impacted. The second step served to identify cost-effective resolutions to minimize the necessary S&M actions identified. The resolution categories consisted of removing the item from the facility, performing a modification action to the item, or providing a technical justification for no action. The third step was to perform the evaluations, studies, or calculations necessary to support the desired end-state as suggested by step two.

This presentation discusses how this process is being implemented at various SRS facilities in the long-term S&M life cycle phase.

Caroline Bruns is currently providing the technical support for S&M on various Deactivation Projects at WSRC. She obtained a BS in Civil Engineering from the University of Delaware. Ms. Bruns has 22 years experience in commercial and nuclear construction, design engineering, operational readiness, program development, and assessments, and currently supports the deactivation planning and execution at SRS.

Risk-Based Method for Prioritizing Hazard Reduction Activities at Inactive Facilities

Victor Fricke and Gary Rose, Westinghouse Savannah River Company, LLC

[Yannitell—SRS Facility Deactivation Session] For inactive facilities, the level of care-taking attention has been reduced. These inactive facilities will stand for an indeterminate time, and may gradually deteriorate. In some cases, the end of operations was sudden, and hazards still remain. Good stewardship and risk management frequently dictate a level of surveillance and maintenance that can be costly. Addressing the hazards and correcting them can simultaneously reduce the risk level, the management burden, and the cost.

Because funding for these facilities is generally in short supply, it is important to apply limited resources in the most cost-effective way. Since the paramount consideration is safety, it is important to establish priorities that address the highest risk hazards first.

This presentation describes the method used at SRS to determine priorities for corrective actions at inactive facilities. It uses a systematic approach that concentrates on individual hazards, software to manage the information, hazard inspection walk-downs by a team of experts, and an objective scoring system to determine relative risk. It is iteractive on an annual cycle, and integrated into the budget planning process.

Victor Fricke received a BA degree in Physics from Northeastern University in 1967, and a MS in Nuclear Engineering from Purdue in 1969. He has 28 years of experience in the nuclear industry, eighteen of which were in the field of decommissioning, including ten years in the Three Mile Island cleanup program.

Gary R. Rose received his B.Ch.E. degree form the Georgia Institute of Technology in 1983. He has eleven years of DOE complex nuclear experience at the Savannah River Site of which five were in the area of site decommissioning program development. Mr. Rose is currently responsible for performing risk-based prioritized facility walkdowns.

Deactivation of 321-M Fuel Fabrication Facility

Marley Bruns, Westinghouse Savannah River Company, LLC

The 321-M Fuel Fabrication Facility was constructed in 1956. The facility was designed and built to manufacture aluminum clad fuel elements for the production reactors located on site. Operations commenced in 1957. After 32 years of operation the facility was placed in a standby state when the production reactors were shut down. In 1995 the facility was permanently shut down after a de-inventory campaign removed the bulk of HEU and scrap U-Aluminum. This was followed with insitu measurements to quantify the amount of U235 that remained as holdup material in equipment and exhaust duct systems. This was the basis for the radioactive inventory for the facility.

Planning was initiated in late 1997 for deactivating the facility. Endpoints using the Hierarchical Method were finalized and a deactivation plan was written and approved. The end state vision was chosen to place the facility in a passive safe and stable condition. To accomplish this, easily obtained HEU and U-Al were to be removed and the remaining contamination products stabilized in place to preclude the spread of contamination. In addition, all hazardous materials were to be removed from the building. In March 1998 the deactivation work began with a limited budget. In mid 1998, a Large Scale Demonstration Deployment Project (LSDDP) was awarded by DOE to demonstrate innovative deactivation technologies. As a result many of the individual endpoints were deferred until technologies were identified, chosen and deployed. The LSDDP helped leverage additional funding for the deactivation project. The LSDDP successfully completed in late 1999.

During the LSDDP the final end state was changed. Part of this was due to the large cost ($1M) to replace the roof for an excess facility that has no reuse. Subsequently the emphasis was changed from stabilizing in place to removal of all HEU and U-Al from the facility to preclude the roof replacement cost. Thus, the scope of the project changed to include removal of equipment and duct to accomplish this goal. This required criticality controls for handling the HEU and U-Al. The project is currently removing loose items from the contaminated areas and will progress to removing larger process equipment and duct work.

This presentation covers the flexibility required to bring a deactivation project to maturity as funding, philosophies and other projects impact the original deactivation planning.

Marley Bruns is currently a Principal Engineer providing the technical support to the 321-M Deactivation Project at WSRC. He holds a BS in Mechanical Engineering from the University of Nebraska. Mr. Bruns has 27 years experience in heavy commercial and nuclear construction, project scheduling and management, decommissioning and deactivation planning and execution. Recently he was also the test engineer for Size Reduction LSDDP demonstration that was successfully performed at 321-M.

Decision Process for the Decommissioning of the R-Disassembly Basin at SRS

William Austin; John B. Pickett; Heatherly H. Dukes; Karl D. Tesch; and Jerry Hansen, Westinghouse Savannah River Company, LLC

The 105-R Disassembly Basin is a reinforced concrete structure of blast-resistant design connected to the west side of the 105-R reactor building. It is the largest of the production reactor basins encompassing approximately 42,000 square feet and containing approximately 5 million gallons of water. The basin is an unlined basin with depths varying from 17 to 30 feet. The disassembly basin was primarily designed to cool irradiated material and provide a shielded environment for operators to prepare the material shipment to other areas. The facility initiated operations in 1953 and was retired from service in 1964.

The disassembly basin has been emptied of all fuel and target (fissile) material. Although no basin management is currently being performed, a significant level of water is in the basin, about 6 feet below normal full. The water remains stagnated as all deionizers, cooling systems, and filtration systems have been shutdown years ago. The basin has sludge over much of the basin floor and there are pieces of scrap aluminum and universal sleeve housings on the floor. The basin water contains approximately 750 curies of radioactivity, primarily tritium. The potential of leakage of the basin would result in immediate contamination of the groundwater due to the high water table in the R-area.

Specific alternatives for the decommissioning of this basin and the treatment of the water have been evaluated for hazards, accident risk, project risk, environmental affects, and cost of completion. The evaluation included use of a diversified team for identification of alternatives, hazards, potential accidents, and alternative conclusions. This paper describes the alternative analysis and decision process leading to the recommended disposition of the basin.

William Austin is currently a Program Manager within the Facilities Disposition Division at WSRC. He holds a BS degree in engineering from NC State University. Mr. Austin has 30 years of experience predominately concentrated in decommissioning activities. Mr. Austin initiated the D&D program at SRS in 1991 and led successful teams in the decommissioning of the old tritium facility, 232-F, the heavy water towers, 412-D, and numerous smaller facilities. Prior to SRS, he held various engineering and programmatic positions leading to the successful cleanup of the damaged reactor at Three Mile Island.

Clean-up of R Disassembly Basin at SRS

John Pickett and Heatherly Dukes, Westinghouse Savannah River Company, LLC

The R Reactor was designed and used to produce plutonium for DOE from December 1953 until its shutdown in 1964. The reactor disassembly basin provided cooling and underwater storage of irradiated assemblies and other reactor components until this material was shipped to other locations for processing. All fuel and target material has been removed from the basin, and all water-processing systems have been deactivated.

The unlined, concrete basin has a footprint of approximately 42,000 ft2, has a variable depth from 17 to 30 ft., and contains roughly 5 million gallons of water. There is a thin (~1/4 in.) layer of sludge at the bottom of the basin. The principle radiological contaminates in the basin are Cs137, SR90, and Tritium.

This presentation addresses the efforts being taken to remove the Cs137 and SR90 from the basin. In conjunction with the DOE Office of Science and Technology's National Energy Technology Laboratory, Savannah River Site's Facilities Disposition Division has initiated operations to remove contaminates using two separate processing technologies. The first technology, the 3M/Empore System, uses a filtration unit, whereas the second, the Selion System, uses ion exchange columns. Both technologies selectively remove the Cs137 and SR90 radionuclides so the secondary waste is minimized.

This presentation will discuss the current status of the cleanup process, the results achieved to date, and the lessons learned resulting from deployment of these technologies.

John Pickett received his BA in Chemistry from Vanderbilt U and his Ph.D. in Inorganic Chemistry from the University of Georgia. He is currently a Principal Technical Advisor with the Facilities Disposition Division (FDD) of WSRC. Dr. Pickett has been employed at the Savannah River Site since 1977, both in the Savannah River Technology Center and plant operations. His specialties include uranium chemistry, (precipitation, wastewater treatment, and biological toxicity), regulatory compliance (RCRA and CWA), and waste treatment (including cementitious stabilization and vitrification). Dr. Pickett is currently involved in the characterization and decommissioning of deactivated nuclear facilities, including the site's Reactor Disassembly basins. He is leading the deployment of a new highly selective ion-exchange materials for Cs-137 and Sr-90 at the R-Reactor Disassembly basin.

Heatherly Dukes has degrees in Nuclear Engineering and Health Physics. Relevant work experience includes 3 years as a project engineer; 6 years as a Waste Manager; 6 years in decontamination work with 3 of those years being the Facility Manager for the SRS Decontamination Facility; she currently holds the position as Engineering Manager of the D&D and Technology Section. Within these work experiences, Ms. Dukes has overseen the implementation of numerous innovative technologies and techniques that were either new to SRS or to the DOE Complex.

Assett for Dismantle and Removal Services

Thomas Feske, Westinghouse Savannah River Company, LLC

The Asset for Dismantle and Removal Services (AFS) is an approved program at the Savannah River Site (SRS) to utilize the salvage value of unneeded assets to offset the costs to disposition the assets. The AFS Program is one of several programs such as direct sales, auctions, and economic development initiatives used at SRS to disposition unneeded assets. The added value of this program is one that enables SRS to package "The Good, The Bad, and The Ugly" assets in a scope of work to minimize costs to disposition the assets.

To date, the AFS Program has enabled SRS to save $9,355K in D&R costs for $1,020 in "out of pocket" costs. The AFS Program is saving 90% on every dollar. In addition to the cost savings, the work has enabled the site to eliminate over 45,700-sq. ft. in legacy footprint.

The presentation and discussion will highlight:

- actual data from all previous work,
- spreadsheet for estimating values,
- critical elements of the program for making it a success, and
- sensitivities with new disposition alternatives.

In addition, you will receive an update on the latest initiative by the site to include the unneeded assets as mission related to disposition legacy assets versus simply treating the assets as excess government property.

Thomas J. Feske has a degree in Mechanical Engineering and has more than 27 years experience. His work experience included assignments in maintenance, production, engineering, projects, and program management with DuPont Commercial and SRS. Mr. Feske currently leads the AFS Program for the Facilities Disposition Division at the Savannah River Site. He led the initial AFS Pilot Program and was an integral part of developing the program from a pilot effort to an approved AFS Disposition Program.

Disposition Technologies

Jeff Lee and Bill Giddings, Westinghouse Savannah River Company, LLC

The Facilities Disposition Division (FDD) at the Savannah River Site provides the technical expertise and specialty equipment for characterization, decontamination and dismantlement activities throughout the site. FDD also utilizes various health & safety related technologies to improve worker comfort and increase job effectiveness.

FDD maintains an active disposition technology program to continuously evaluate and upgrade their "tool box." FDD makes use of the DOE EM Office of Science and Technology's demonstration or deployment projects, which provide both monetary and technical assistance in the demonstration/deployment activities. The technologies that provide cost effective methods to accomplish facility disposition activities are added to FDD's Decontamination Facilities "tool box."

Facility Disposition Technologies in the "tool box," as well as those currently being demonstrated/ deployed, will be discussed in this presentation. They will be presented in the following technology categories:

· Characterization

· Decontamination

· Liquid Waste Processing

· Dismantlement

· Solid Waste Volume Reduction

· Personnel Health & Safety & Productivity

The Facilities Disposition Division utilizes these technologies both for the division's facility disposition activities as well for providing services such as in-situ facility decontamination, and large equipment decontamination and size reduction to all divisions at the Savannah River Site.

Jeff Lee has worked at Savannah River Site for 13 years. He has been part of the site's D&D group for the last eight years. Mr. Lee is the Facilities Disposition Division technology representative and sits on the Site Technology Coordination Group (STCG). Jeff recently completed the 321-M Fuel Fabrication Facility Large Scale Demonstration & Deployment Project. Jeff was the Principal Investigator for this 21-Month NETL-DDFA funded project. The 321-M LSDDP demonstrated five technologies. Jeff is currently managing multiple hazard mitigation projects/tasks and is the technical liaison for two AEA technologies being deployed at the Decon Facility. AEA Technology is providing these technologies through NETL as part of an International Agreement. Jeff has a Mechanical Engineering degree from the US Naval Academy and MBA from the University of South Carolina. He has also worked in the commercial nuclear power industry (6 years) and in the US Navy's Nuclear Power Program (5 years).

Long Range Facility Disposition Planning

Melanie Poe-Hozey, Westinghouse Savannah River Company, LLC

Historically, the cost estimating practices for the disposition of facilities in the distant future were not performed on a consistent basis at the Savannah River Site. Last year, the Facilities Disposition Division committed to establish a consistent basis for projecting facility disposition activity costs, including deactivation, surveillance and maintenance, and eventual decommissioning. The primary objective was to implement a methodology which applies to all disposition activities and which incorporates the use of a comprehensive base of all capital structures at SRS, thereby providing the means to consistently apply estimate development from year to year. The accuracy of the estimates will be improved over time, as more data becomes available.

Input was solicited from various sources in order to develop a methodology based on the best available methods and data in the country. The Association for the Advancement of Cost Engineering (AACE), DOE's National Facility Deactivation Initiative (NFDI), and DOE's National Decontamination and Decommissioning (D&D) Organization were consulted. Additionally, various cost methodologies were reviewed, such as DOE's Active/Excess Facilities Data Collection System, DOE's Remedial Action Cost Engineering and Requirements (RACER) System, and a recently developed D&D Parametric Model developed at the INEEL.

The site concluded that the estimating methodology should be developed using the recent INEEL D&D Parametric Model as its basis. This model was chosen because it provides a rough order of magnitude cost estimate with accuracy greater than DOE's Active/Excess Facilities Data Collection System and with an acceptable level of resources. The model is based on ample actual disposition activities at INEEL, has been demonstrated to compare favorably with more detailed estimates, compares favorably with selected SRS projects, received a "favorable review" from the Army Corps of Engineers, and a recent IG audit reviewed the system and reported "no findings."

This presentation will discuss the system developed at INEEL, how it was modified to reflect local economics and site specific parameters not present at INEEL, and how it was used to provide consistent projections for long-range facility disposition activities.

Melanie Poe-Hozey is a Senior Program Planner in the Facilities Disposition Division (FDD) at DOE's Savannah River Site in South Carolina. FDD is the BWXT Division of the Westinghouse Savannah River Company, L.L.C., responsible for managing the site's Surplus Facility Disposition Program. She holds a BS degree in business administration management and a Master of Business Administration from the University of South Carolina and completed post-graduate courses in mechanical engineering at Clemson University. Ms. Poe-Hozey has 17 years of experience predominately in project planning, program management and planning, and budgeting at a strategic, long-range programmatic level. Prior to this assignment, Ms. Poe-hozey held numerous positions in which she was responsible for the development and implementation of various site management control system components.

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Session XXII

Innovative Remedial Technologies Interactive Poster Session

Hap Thron, U.S. Department of Energy, Headquarters

Technology development and implementation at DOE sites is one of DOE's Strategic Plan objectives. Information on programmatic integration, cost performance, and technology development and deployment, including approaches to overcome barriers to implementation, is requested.

FY2000 Technology Deployments on the Richland Environmental Restoration Project

Kim Koegler, Bechtel Hanford Inc.

The Richland Environmental Restoration (ER) Project is actively conducting decommissioning of excess facilities at the Hanford Site, as well as the remediation of contaminated soils and groundwater. The ER Project continues to be proactive in the use of technologies that improve on the technical, schedule, and cost performance over the baseline.

Six improved technologies are planned for deployment during fiscal year 2000. The Ultrasonic Liquid Level Detection Technology was deployed for the non-intrusive detection of standing liquid in vessels and piping. The Remote Concrete Sampling System consists of a Brokk® 150N with a remote concrete coring attachment; this system is being deployed to collect concrete cores from the floors of process cells for facility characterization. The 3-D Visual and Gamma Ray Imaging System and the In Situ Object Counting System are being deployed for radiation screening for transuranic materials in a chemical processing facility. A robotic crawler outfitted with a camera and lights, and with a real-time gross-gamma monitor, is being deployed for the characterization of the drain line of a chemical processing facility. And a Small Diameter Geophysical Logging System uses a Geoprobe® to push small diameter rods, a passive gamma-ray scintillation detector is then lowered down the inside of the rods for collection of spectral gamma data.

This presentation will report on the field deployment of these improved technologies at the Hanford Site during fiscal year 2000.

Kim Koegler is a Senior Engineering Specialist with Bechtel Hanford, Inc. Mr. Koegler currently works in the Technology Application Function focused on Decommissioning, Surveillance/Maintenance and Transition Projects. He also directs Technology Integration on the Canyon Disposition Initiative Project. He has worked in environmental restoration at the Hanford Site since 1989.

Performance Assessment of In-Situ Remediation involving DNAPL Removal

Richard Jackson; John Ewing; Minquan Jin; and Hans Meinardus, Duke Engineering & Services

There is no generally accepted protocol for the performance assessment (PA) of remedial operations that remove chlorinated degreasing solvents and other Dense Nuclear Aquos Phase Liquids (DNAPLs) from the subsurface. Many PA studies simply rely upon the change in groundwater concentration before and after remediation. However, this assumes that the measured changes in concentration reflect proportional changes in DNAPL mass and/or volume. Other PA studies employ soil cores to demonstrate changes in the mass of the DNAPL chemical(s) before, during, and after remediation. This approach assumes that enough soil cores are collected without loss of DNAPL, preserved and analyzed to sample the representative elementary volume of the soil. Then geostatistical assumptions are required to extrapolate over the zone of DNAPL contamination in order to estimate the volume of DNAPL present. Finally, the partitioning interwell tracer test (PITT) can be used to measure the volume and spatial distribution of DNAPL in the subsurface. The assumptions underlying each approach are examined and a quantitative field comparison presented.

Richard Jackson is an engineering supervisor with Duke Engineering & Services' Geosciences group in Austin, Texas. He has degrees in hydrology, civil engineering, and earth sciences. Mr. Jackson is responsible for managing a group of hydrogeologists, engineers, and chemists that undertakes the characterization and remediation of both chlorinated and fuel hydrocarbons.

Remediation of Ecologically Sensitive Wetlands Contaminated with Cs-137 Using Micaceous Minerals

Daniel I. Kaplan; Tom Hinton; Anna Knox; and Steve Serkiz, Westinghouse Savannah River Company

Over 3,000 acres of wetlands on the Savannah River Site (SRS) are contaminated with 564 Ci of Cs-137 and pose a significant remediation challenge to DOE. Because high Cs mobility on the SRS is thought to be due in part to poor sorptive properties of SRS kaolinite-dominated soils, we tested the hypothesis that an addition of naturally occurring micaceous minerals to wetlands would sequester Cs-137 and, thereby, reduce its bioavailability. A proof-of-concept study was conducted in which incremental additions of two micas to a sediment contaminated for >35-yr with Cs-137 resulted in corresponding reductions in the Cs-137 activity released into the water. Other studies identified minerals that sorbed large amounts of Cs (Kd values >10,000 mL/g) and desorbed only trace amounts of Cs (even under extremely harsh leaching conditions). Specific mineral properties beneficial to Cs-137 sorption and retention were identified for future selection of quarried minerals for this technology. This technology appears to offer a non-intrusive, in situ approach to immobilize Cs-137 in ecologically sensitive wetlands.

Dan Kaplan received his Ph.D. from the University of Georgia in 1993 in Environmental Geochemistry. Since then he has worked at PNNL and WSRC. Dr. Kaplan has published research and been awarded patents related to ground water and sediment remediation, fate and transport of contaminants, colloid-facilitated contaminant transport, and monitored natural attenuation.

EarthSaw Field Demo: Construction of a Bottom Barrier with Soft Buoyant Grout

Ernest E. Carter , P.E. Carter Technologies Co. and John Livezey, Federal Industrial Products

EarthSaw is a set of related technologies which make it possible to construct a bottom barrier and a complete air tight vault under and around a legacy buried waste site without drilling or excavating through the waste and without complex machinery.

The EarthSaw buoyant barrier field demo used a buoyant "TECT B" grout in a vertical perimeter trench around a simulated landfill "block" and a simple cable saw to undercut a block of earth and form a 2-foot thick grout barrier completely under and around the block. The barrier grout was a unique non-hardening deformable putty which cannot crack and exhibited permeability of less then 1 x 10-8 cm/sec.

When mated to an impermeable surface cap the structure becomes an air-tight vault with integrated passive leak detection and repair. The basic method may be applied to sites covering several acres to depths of 100 feet. Variations on the basic method have the potential to treat sites as large as 100 acres.

Ernest Carter has 20 years of experience in underground construction and grouting techniques. He holds over 20 patents and has served as a grouting consultant and developer for Fortune 500 companies and DOE facilities. Mr. Carter is president of Carter Technologies Co, based in Sugar Land, Texas. He is the inventor of the EarthSaw technology, which is licensed by Federal Industrial Products, a division of MI drilling fluids, which is co-owned by Schlumberger and Smith International.

Petrobond® Oil Solidification Polymer: Helping solve oil waste problems in the DOE complex

Donald R. Krause, BWXT Services, Inc.; Ward Brunkow, The Chamberlain Group, Inc.; and Dennis Campbell, Nochar, Inc.

The LSDDP at Mound has demonstrated a technology for solidifying petroleum fluids and sludges, Nochar N-990 Petrobond®, such that the solidified material meet the waste acceptance criteria at the final disposal facilities. The focus is now to accomplish additional deployments at DOE sites that have immediate need for treatment and disposal of waste oil fluids and sludges.

The following sites have expressed an interest:

1. Ashtabula has slightly contaminated oil with uranium, including several types of kerosene butyl-phosphate mixtures, lube-oil based liquids, and water/oil mixtures in numerous containers.
2. Sandia has 35 20-gallon containers with metals slightly above regulatory limits and varying amounts of tritium contamination.
3. Princeton Plasma Physics Laboratory has about 10 gallons of slightly contaminated vacuum pump oil.
4. Rocky Flats has about 43,000 gallons of aqueous and non-aqueous solutions.
5. Savannah River has expressed an interest in various areas, particularly PUREX and tritiated oils.

This paper will discuss these oil solidification deployments including the setups, procedures, and results, as well as how this technology will aid in providing a solution for this complex mixed-waste handling issue for the rest of the DOE complex.

Donald Krause is currently the Project Manager for Technology Programs for BWXT of Ohio at the Mound Site near Dayton, Ohio. The projects Mr. Krause has under him at this time are the DOE Office of Science and Technology Tritium Large Scale Technology Demonstration Program and the Accelerated Site Technology Deployment "Old Cave" Characterization Project.

Integrated Characterization of a TCE Contaminant Plume within a Basalt Aquifier

Katherine Owens; Leland (Roy) Mink; and Allan Wylie, University of Idaho, Idaho Water Resources Research Institute

The Idaho Universities Research Consortium through the Idaho Water Resources Research Institute is conducting research on a tricholorethene (TCE) plume in a portion of the Snake River Plain Aquifer underlying the Idaho National Engineering and Environmental Laboratory (INEEL). The purpose of the research is to collect data on the biological, physical, and chemical processes intrinsic to the specific area of concern and develop a holistic model of the entire system. The data was used to determine if natural attenuation and enhanced in situ bioremediation is an effective alternative for environmental cleanup in fracutred rock media. The research focused on evaluating intrinsic remediation of the plume by further understanding the hydrogeology, microbiology, and geochemistry of the fractured rock media of the Snake River Plain aquifer. Over forty researchers from the University of Idaho, Idaho State University, and Boise State University were involved in this integrated effort with INEEL engineers and scientists. The most significant outcome of this research was the information exchange and interaction between the university researchers and their INEEL collaborators. The data collected from these studies contributed to the successful demonstration of an enhanced in situ bioremediation process that effectively degraded TCE in the Test Area North (TAN) plume of the INEEL. The success of this new bioremediation process has resulted in a reversal of the preferred alternative in the TAN record of decision from pump and treat in favor of the innovative technology.

Katherine Owens is an Associate Project Manager with the Idaho Water Resources Research Institute at the University of Idaho and has overseen the Institute's research projects at the INEEL for the past two years. Prior to her association with the University of Idaho, Ms. Owens was involved with environmental cleanup and waste management projects at the INEEL specifically in the development and deployment of innovative technologies for Buried and Mixed Waste remediation. Katherine holds a B.S. degree in Corporate Training and an M.S. degree in Environmental Studies.

Dynamic Underground Stripping and Hydrous Pyrolysis/ Oxidation of PCE and TCE at Savannah River Site

Dave Parkinson and Norm Brown, Integrated Water Technologies, Inc.

Integrated Water Resources, Inc. (IWR) designed, constructed, and is presently operating a thermal remediation system for the removal of the solvents PCE and TCE from a contaminated aquifer at the former Solvent Storage Tank area at Savannah River Site, Aiken, South Carolina. IWR's program for the site involves the application of the thermal remediation technologies developed at Lawrence Livermore National Laboratory and licensed by IWR from the University of California:

- Dynamic Underground Stripping, a combination of steam injection and vapor and ground water extraction; and
- Hydrous Pyrolysis/Oxidation (HPO) — Destruction of underground contaminants through oxidation in the presence of injected steam.

The target zone for steam injection extends over an area of approximately 100 feet by 100 feet, from 20 feet below ground surface to 160 feet below ground surface. Approximately 13,000 kg of the contaminants PCE and TCE have been identified and distributed throughout this volume. Sands and silts comprise the majority of the subsurface volume, with several thin silt-clay layers.

IWR's innovative design, in partnership with IT Corporation, makes use of site supplied steam to reduce cost, as well as steam driven jet pumps for ground water extraction. Active steam operations are expected to take 6 months, with an additional 3 months of intermittent steam and air injection to keep the formation both hot and oxygenated to enhance in situ destruction of dissolved phase contaminants by Hydrous Pyrolysis/Oxidation.

Dave Parkinson's expertise in the Earth Sciences ranges from research at the U.S. Geological Survey, and the Geological Survey of Canada, to international projects in Japan, New Zealand and Canada. At IWT, Dr. Parkinson is responsible for technical management and oversight of regional ground water exploration and development projects, thermal remediation projects, and technical due diligence regarding natural resources and asset management.

Norm Brown is an expert in natural resources, with experience in basic research, applied science, exploration and development, and technical/economic analysis. During the last decade, he has worked principally in the water resources, precious metals and oil & gas industries. Dr. Brown is currently engaged in technical program development and executive management for IWT.

Posters

Revolutionary Monitoring Systems for Long-term Environmental Stewardship Applications

George C. Allen, Jr.; Wendy S. Cieslak; Dan Horschel; Erik K. Webb; Sandia National Laboratories

Environmental monitoring is a key component of long-term stewardship at sites where remedial actions have been completed and some amount of contamination remains. Long-term monitoring verifies over time that remediation efforts have succeeded and that the assumptions made at completion of restoration actions are still valid. The projected costs of long-term environmental monitoring at Department of Energy sites are huge when time duration in decades are considered. Potential monitoring costs are even larger when other Federal agency and private sites are considered. Typically, projected costs are based on an extrapolation of existing technology. We strongly believe that applications of revolutionary new monitoring technologies currently in development will enable significant cost reductions while enhancing the trust of concerned citizens in data about previously remediated sites.

Long-term environmental monitoring cost savings will only be realized if we consider the system as a complete whole and appropriately apply new technologies to this application. Rapidly expanding, capabilities in micro- and nano-system, information management, and computer modeling technologies are enabling breakthroughs in high-resolution sensing and monitoring. Personnel at Sandia National Laboratories have decades of experience in the development and use of methods for sensing and interpreting information about the earth's subsurface environment. Sandia's program for sensor development already employs more than one hundred technical professionals who are extending the state-of-the-art in sensor technologies for defense systems, commercial applications, and environmental monitoring. Our capabilities in the geosciences coupled with experience in environmental restoration bring the system focus needed for environmental monitoring applications. We are applying these capabilities to the development of next generation monitoring systems that can also be applied to environmental stewardship.

The objective of this paper is to present a representative sampling of the exciting new technologies that can be applied to environmental monitoring. These range from Sandia's highly visible "chem-lab-on-a-chip" initially developed through laboratory-directed research and development (LDRD) to other less well-known sensors and analysis tools that may significantly change the way we collect monitoring data and turn it into knowledge. We want to share a vision and potential for opportunity to improve future environmental monitoring needed for long-term stewardship.

George C. Allen, Jr. is a Senior Manager for Environmental Restoration Technologies at Sandia National Laboratories in Albuquerque, NM. He has multiple technical degrees (BS, MS, & PhD) in Civil and Nuclear Engineering from Massachusetts Institute of Technology. Dr. Allen has been engaged in long-term stewardship planning at Sandia and is an advocate for the application of innovative technologies to environmental monitoring.

DOE-Mound Multi-Site Deployment of WaterWorks Crystals® Aqueous Waste Solidification Technology

Scott Altmayer, Earthline Technologies; Dick Govers, The Chamberlain Group; and Don Krause, B&W Services

Throughout 1999, the DOE-Mound Site initiated an EM-50 funded Large Scale Demonstration and Deployment Project (LSDDP) to boldly go where no site has gone before. They successfully met their target to identify and deploy 5 - 10 new technologies or methods to accomplish the demolition and restoration of tritium-contaminated facilities over the next 5 years in a safer and more cost-effective fashion. One need was to identify and validate alternate mixed and/or low-level waste solidification (or chemical stabilization) technologies for aqueous sludges and residues. Traditional solidification technology was developed throughout the 1980's to support the 10CFR61 rulemaking that governed the acceptable methods and criteria for near-surface management and disposal of low-level waste. This rulemaking was supplemented by a variety of developmental testing, NRC technical guidance documents, and national standards (ANSI/ANS N55.1) which assumed the traditional burial of solidified waste in containers, typically drums. The vintage technology followed the lead of hazardous waste treatment, storage, Panel Session: Deactivation and Decommissioning and disposal (TSD) facilities from the 1970's and emphasized solidification with inorganic additives like flyash, cement, and clay. Indeed, most nuclear plants of this vintage had installed cement-based radwaste solidification systems. By the late 1980's many of these systems were obsolete or did not perform properly due to the varied nature of LLW. In the later 1990's, alternate LLW TSD's became available. As contrasted to container burial, some of these facilities used improved treatment technologies and operations/disposal protocols that allow or require traditional, cut-and-cover, compacted landfill burial approaches.

These options have opened the pathway for safe efficient management and disposal of selected types of bulk-solidified/absorbed liquid waste. DOE-Mound recognized this as a growing alternative to their baseline "bricking" option based on vintage 1980 technology. This paper compares the successes, limitations, and lessons-learned for three sites that deployed the WaterWorks Crystals® solidification technology as a non-conventional but cost-effective alternative for ten (10) aqueous sludge waste streams.

For approximateky seven years Scott Altmayer lead technology development and deployment enhancements at the Ashtabula Environmental Management Project (AEMP) (a.k.a. RMI Decommissioning Project.) He continues to evaluate, test, deploy, and market new waste remediation technologies that are needed to solve mixed waste, low-level waste, contaminated soil, and groundwater challenges around the country.

Can Pedotransfer Models be used to Characterize Unsaturated Hydraulic Properties in Geologic Materials?

Kristine E. Baker, Idaho National Engineering and Environmental Laboratory; R.J. Glass and R.M. Holt, Sandia National Laboratories

A large number of hydraulic property estimates are required to model flow and transport in heterogeneous vadose zones. Because measurements of unsaturated hydraulic properties are costly and time consuming, pedotransfer models that predict hydraulic properties from easily collected textural data (e.g., grain size distribution and bulk density) are appealing. These models have been applied to soils, but their use in geologic materials has not been tested. We evaluate the use of pedotransfer models in alluvial and fluvial deposits, which commonly underlie DOE facilities in the western United States. We applied the model of Haverkamp and Parlange (1986) to samples collected from a DOE infiltration research site in Socorro, New Mexico. The model failed to predict hydraulic properties within the range of measurement uncertainty. A Monte Carlo error analysis was conducted to determine optimum conditions for model predictions and to evaluate the impact of measurement & error. We found that a very small amount of measurement error significantly impacts model results, even for large sample sets. The model results improved for a narrow range of particle sizes, but model uncertainty was still much greater than measurement uncertainty. We conclude that pedotransfer models for estimating unsaturated hydraulic properties have limited usefulness in geologic materials.

Kristine Baker received a B.S. in Geology from the University of New Mexico in Albuquerque, New Mexico in 1997 and anticipates graduation from NM Tech in Socorro, New Mexico in 2000 with an M.S. in Hydrology. She is currently employed at the INEEL in Idaho Falls, Idaho as a senior scientist primarily supporting vadose zone research.

Facilitating Site Closure and Transition to Stewardship

Janet Bashaw; Gaynor Dawson; and Steve Meador, Project Performance Corporation and Marc Jones, U.S. Department of Energy, Headquarters

DOE is committed to accelerating cleanup and closing sites. Acceleration commitments have been with DOE's cleanup program since it "turned the corner" and began spending more on fieldwork than studies in the early to mid-1990's. Closure commitments have evolved from identifying end-states to achieving a "walk-away" condition or transfer to long-term stewardship, and present new requirements and new challenges to DOE.

Closure is comprised of multiple areas, including environmental (e.g., caps installed, acres transfered), and administrative tasks (e.g., data management, transfer of personal property). Traditionally the focus has been placed on progress toward environmental closure. However, with so many activities converging at one point in time (i.e., at the point when the last environmental action is in place/complete), there is the potential for disconnect between the time when the environmental activities are complete, and the time when the site has concluded administrative tasks required for closure.

To address this situation, DOE is planning to develop and pilot a series of templates and tools to support safe and effective closure. Completion of the templates will provide a needed framework to assist in tracking and reporting progress toward closure, assist in identifying data needs for long-term stewardship as well as those to identify and communicate residual uncertainties once a site is closed, and assist in reaching closure by identifying the nature and sequence of activities required (e.g., worker transition, pension plans) to have administrative transfers ready when needed. The tools will facilitate the process of tailoring templates to the specific needs of each site. This paper will present the results of the pilot projects and the status of the closure/stewardship packages.

Janet Bashaw is a Vice President at Project Performance Corporation. She is an environmental science and policy analyst with expertise in conducting technical, regulatory, and policy analyses. Ms. Bashaw is currenlty working with DOE and DoD to identify opportunties for streamlining restoration initiatives, accelerating site closure, and identifying long-term sterwardship needs and responsibilties.

Traceability of Performance Evaluation Materials for Long Term Stewardship Measurements

Raymond J. Bath Ph.D.; Pamela Greenlaw; and Anna Berne Ph.D., US DOE/Environmental Measurements Laboratory

Quality data are necessary to support regulatory requirements for Long Term Stewardship of the Department of Energy's closed facilities. With advancing collection and monitoring technologies there is no doubt that also the reliability of the data over the lifetime of the program will be important. An important component of the data reliability and comparability process is a quality assurance performance evaluation (PE) program. The PE program can provide an essential link to data collected and analyzed by different technologies. The National Institute of Standards and Technologies (NIST) and the DOE's Office of Environmental Management (EM) National Analytical Management Program (NAMP) have instituted a low level radiological measurements PE traceability program. Participating in the NIST traceability program is DOE's EM Environmental Measurements Laboratory (EML). Currently, EML supplies the DOE complex with quality assurance PE materials traceable to NIST for low level radiological measurements through its Quality Assessment Program (QAP). The NIST traceable PE materials included in QAP are for the matrices of soil, water, vegetation, and air filters and they contain the low-level categories of alpha, beta, and gamma nuclides. Presented are the elements for the LTS program to achieve NIST traceability for its PE measurements.

Raymond Bath is the Director of the Department of Energy's Environmental Measurements Laboratory Quality Assurance and Metrology division. The activities of the division include: DOE methods compendium (HASL) for radiochemical analyses; measurement of sensitive-classified low level environmental radiochemical samples; NIST accreditation and traceability of radiochemical performance evaluation samples; DOE quality assurance performance evaluation radiochemical program (QAP); validation and evaluation of analytical instruments, methods, and data; and providing to the DOE complex acknowledged international experts for the analysis and interpretation of environmental radiochemical samples, Dr. Bath has directed environmental field analytical and onsite measurement services, forensic toxicology laboratories, forensic science departments, industrial toxicology laboratories, radiochemistry laboratories, and university clinical laboratories.

New ER Additives that Stabilize Heavy Metals; Cheaper, Faster, Better, and Safer

Gary Benda, U.S. Energy Corporation; and Charlie Williams, E & C Williams

Large volumes of Environmental Remediation (ER) wastes contaminated with heavy metals will be generated to meet the RCRA standards. New additives are being developed that will minimize additional waste bulking and still insure that the final residue will comply with regulatory requirements.

Many additives will be reviewed, but one new innovative media introduced is calcium sulfide. The stabilization of characteristic hazardous waste with sulfides is a simple and well-proven method in binding heavy metals and converting the material to non-hazardous media. Recent developments in manufacturing and production have now rendered this product economical for both small and large-scale treatment of hazardous and mixed waste. In the last five years, significant efforts have been made to introduce this technology in the radioactive/hazardous mixed waste markets. The advantages are its simple use, minimum waste volume increase, long term stability, and economic savings.

This poster/paper will describe recent developments that make it more advantageous to treatment of Environmental Protection Agency characteristic mixed waste than the past stabilization agents.

Gary Benda is President of US ENERGY and has over twenty three years of federal and commercial waste and environmental management experience. He is internationally recognized in project management, business development, packaging, processing, transportation, and disposal of both hazardous, radioactive, and mixed waste. Mr. Benda has managed large complex licensing projects, privatization programs, and commercial and federal proposals. In has a BS & MS degree in Health Physics and an MBA. He has also been a C.H.P for over 15 years.

Integrated Decision Analysis Tools for Land and Watershed Management

Robert P. Breckenridge; Ronald C. Rope; and Randy D. Lee, Idaho National Engineering and Environmental Laboratory

Integrated decision analysis tools are being developed by a collaborative team of the INEEL, University of Utah, Idaho State University, and the Henry's Fork Foundation. These tools can be used to address long-term stewardship concerns related to future land and water management at the watershed scale. Addressing these concerns requires predictive, integrated decision support tools that pose the right scientific questions, identify information needs, and provide a defensible, scientific analysis of the linkages among socioeconomic, ecologic, land management, and hydraulic issues. Advanced scientific tools that integrate data from modeling tools for specific system components, and present results in a user-friendly, interactive format are limited. This decision support system will guide decisionmakers through the process of identifying, compiling, analyzing, displaying, and applying data to evaluate how management activities and applicable regulations could influence future land use options.

The INEEL approach utilizes data from State and Federal agencies, academic institutes, and other sources with selected models and then displays modeling results using a geographic information system (GIS). The approach will enhance the ability of DOE, other Federal and State agencies and Universities to partner with local communities to develop and implement long-term stewardship and land management strategies at the watershed level.

Robert P. Breckenridge received a masters degree in Environmental Pollution Control from Pennsylvania State University and has over 20 years experience in the design, implementation, and evaluation of environmental monitoring projects, assessment of environmental risk, and evaluation of waste treatment and disposal facilities.

Intergovernmental Data Quality

Mike Carter, U.S. Environmental Protection Agency

In 1997, the Federal Facilities Restoration and Reuse Office convened the first meeting of an Intergovernmental Data Quality Task Force (IDQTF). The Task Force identified three initial goals:

- To document a Quality System, based upon Specifications and Guidelines for Environmental Data Collection and Environmental Technology Programs (ANSI/ASCQ E-4),
- To develop a guidance/framework that outlines the roles and responsibilities of the EPA and other Federal agencies with regard to Quality Assurance, and
- To develop guidance for implementing government-wide requirements and procedures regarding data quality.

Using the E-4 standard, the IDQTF is developing two major products:

- ***Uniform Federal Policy for Implementing a Quality System.*** Based on Part A of E-4, this policy outlines the requirements for a Quality System.
- ***Consensus Guidance on Documentation of Quality Assurance Project Plans (QAPP).*** This guidance document is to ensure that Federal departments and agencies use consistent QAPPs.

The IDQTF is also identifying consistent QA/QC measures used in the Superfund program. This effort, beginning with data collection, will define "presumptive" QA/QC expectations for Superfund data collection and reduce the time and effort currently spent in negotiating QAPP requirements.

Mike Carter is the Quality Assurance Manager for the EPA Federal Facilities Restoration and Reuse Office. Previously, he was the Director of the Analytical Services Division in the DOE Office of Environmental Management. He has also worked in the EPA Offices of Water, Superfund, and Research and Development.

Progress of Catalytic Oxidation and RCRA Delisting Petition of Tritiated Mixed Waste

Li-Yang Chang, Chit Than, Hiromi Morimoto, and Philip G. Williams, Lawrence Berkeley National Laboratory

Scientists in the United States pharmaceutical industry and academic institutions regularly use tritium and carbon-14 in research and development projects, and process solvents are contaminated. These activities generate moderate to large volumes of mixed waste with mCi to Ci of tritium activity, or mCi of carbon-14. The hazardous component of this waste includes F-listed spent solvents, is designated as ignitable D001 waste, and may contain chloroform (code D022).

As the Environmental Protection Agency (EPA) and the Nuclear Regulatory Commission (NRC) have acknowledged in regulatory documents and in proposed rulemakings, dual regulation of mixed waste under the Atomic Energy Act and the Resource Conservation and Recovery Act (RCRA) presents a number of difficulties. Not least of these is that there are very few RCRA disposal sites which also maintain NRC licenses, and the disposal limit for tritium is orders of magnitude below that required for mixed waste disposal by Lawrence Berkeley National Laboratory (LBNL) alone.

Commercial options for treatment and disposal of tritiated mixed waste have undesirable environmental and fiscal consequences. As an example, currently, the only commercial option for treatment of tritiated mixed waste, incineration, would release tritium to the environment without engineering controls designed to minimize tritium air emissions. Use of such a commercial treatment facility is also prohibitively expensive. Incineration of tritiated mixed waste at one of the Department of Energy (DOE) contractor sites would also lead to release of the tritium, and this would not meet the pollution prevention goals of LBNL and DOE. Thus, the LBNL decided to conduct a tritiated mixed waste treatability study using a catalytic chemical oxidation (CCO) technology. We have sought to ensure the appropriate legal status of this waste by applying for a RCRA Equivalent Treatment Determination for the oxidation approach and Delisting the residues.

LBNL's CCO system consists of a preheater, an oxidation cell, a packed-bed reactor filled with platinum-coated alumna catalyst, and an oxidation product (tritiated water) recovery and emission reduction system which consists of two condensers, a dry-ice cold trap, three water bubblers in series, and a silica gel filter. Using the optimum operating conditions, the destruction and removal efficiency (DRE) of organic solvents exceeds 99.999%. The oxidation product recovery and emission reduction system can confine more than 99.9% of tritium in the waste sample.

Based on multiple test results, we have demonstrated that (a) the F002 and F005 codes of the treatment residues meet the concentration-based land disposal restriction treatment standards and could be delisted, (b) the D001 and F003 codes of the liquid products of oxidation could be deleted on the basis of the Determination of Equivalent Treatment Method for the CCO system, and (c) the treatment residues (water or tritiated water) meet the universal treatment standards for the underlying hazardous constituent. Following these actions, the treatment residues (triated water) can be disposed as low-level radioactive waste at a permitted facility, or tritium in the liquid products might be recovered and recycled. In June 1999, LBNL submitted a "Petition to Delist Tritiated Mixed Waste Treatment Residues" to the EPA Region IX. In April 2000, LBNL also submitted a "Response to EPA's Notice of Deficiency and Technical Review Comments for Lawrence Berkeley National Laboratory's (LBNL's) Delisting Petition" to the EPA Region IX.

Li-Yang Chang has over 18 years of chemical/environmental project management and engineering experience in a variety of soil and groundwater remediation, industrial and municipal wastewater treatment and conservation, hazardous waste/mixed waste treatment and recycling, waste minimization and pollution prevention, RCRA compliance and delisting petition, and chemical/radiation safety projects. Dr. Chang published more than 40 technical papers and reports on waste and environmental management. At Berkeley Laboratory, Dr. Chang is a leading professional of several multi-disciplinary teams in waste treatment, pollution prevention, environmental management, and safety program.

Performance Assessment and Design Considerations Relative to Long-Term Stewardship

Gaynor Dawson; Janet Bashaw; and James Werner, Project Performance Corporation

It has become abundantly clear in recent years that we have neither the technology nor the resources to resolve all environmental contamination in the near term. Indeed, a significant number of sites will rely on containment to maintain protection of human health and the environment. The design of the required containment units has traditionally been based on a default assumption that releases can and will be prevented for the life of the unit in spite of the need for containment in perpetuity. History has demonstrated the fallacy of such an assumption. Indeed, some of the problems we are addressing today are the result of similar assumptions in the past that proved to be in error.

If a presumption of failure is taken as the alternative, it may dramatically change the resulting designs. For instance, if failure is assumed, there is merit in developing designs that facilitate repair or implementation of corrective measures. In order to accomplish that end, we must understand why and how barriers will fail. As a consequence, there also is a need for models of failure modes to help identify the types of repairs that will be required and the efficacy of design changes that might facilitate implementation of those repairs.

In a related vein, there is the potential that new technology in the future and changing demand for materials will render constituents within wastes valuable resources in the future. This raises the issue of designs for retrievablility. Ideally, the resolution of desire for making materials retrievable can lend itself to facilitation of corrective measures as well.

This paper discusses these and related considerations that could fundamentally change how we design and operate repositories of the future.

Gaynor Dawson, P.E., DEE is a chemical engineer with over 30 years experience in hazardous and radioactrive waste management. He is a vice president at Project Performance Corporation assisting his co-authors and the Office of Long-term Stewardship in determining the science and technology needs to support stewardship in the future.

The INEEL Vadose Zone Science and Technology Roadmap: Identifying the R&D Needed to Support Site Cleanup and Stewardship

Brent W. Dixon and Alan K. Yonk, Idaho National Engineering and Environmental Laboratory

The Idaho National Engineering and Environmental Laboratory (INEEL) was tasked by the DOE Idaho Operations Office to prepare a roadmap which includes the plans to apply science and technology solutions to operational problems related to the INEEL Vadose Zone. The INEEL Vadose Zone Roadmap is a program-level roadmap focused on providing better information concerning existing and potential subsurface water and contaminant movement to support multiple waste and material management, D&D, remediation, and stewardship projects at INEEL. The objective of the roadmap is to develop and set the R&D agenda to verify INEEL vadose zone cleanup and ensure the long-term stewardship of INEEL sites. The roadmap identifies research and development activities needed to better understand, detect, and model chemical and radiological contaminant release rates to soils, effects of surface water on contaminant migration, and contaminant attenuation in and transport through the vadose zone and the aquifer.

The roadmap is part of an overall initiative at INEEL to develop a long-term strategy for research and development (R&D) aligned with Site Operations schedules and needs. The R&D activities will be integrated with existing project baselines to support permitting of waste/material storage and treatment facilities and design of remediation, D&D, and monitoring/stewardship activities. As of the end of fiscal year 2000, a draft roadmap has been completed and is in review.

Brent Dixon is an Advisory Engineer supporting Complex-Wide Science and Technology Integration. He is the technical lead for DOE's Environmental Management (EM) science and technology roadmapping methodology development and a process consultant for several ongoing roadmaps. Recently Mr. Dixon helped produce the EM R&D Program Plan and served as lead editor for the DOE Environmental Quality R&D Portfolio. He holds a Bachelor of Science degree in Civil Engineering from MIT, and has 20 years experience at INEEL.

GeoTracker: A Case Study in Building an Internet Accessible Environmental Data Integration Tool

Brendan P. Dooher; Anne M. Happel; and Michael J. Legg, Lawrence Livermore National Laboratory

A variety of environmental information must be tracked to better manage statewide the threat to ground water from petroleum contaminants. Due to concerns about methyl tertiary butyl ether (MTBE) and recent legislation, the California State Water Resources Control Board (SWRCB) has initiated the development of a statewide web based Geographical Information System (GIS) tool called GeoTracker. GeoTracker and GEIMS (Geographical Environmental Information Management System), have been designed to track and integrate environmental data and water resource information in order to assess the vulnerability of ground water from MTBE. GeoTracker uses a variety of tools and information from various data sources to do this. These include hydrogeological and soils data, locations of drinking water wells and leaking underground fuel tank sites, and the degree of dependence of the population on drinking water resources. GEIMS and GeoTracker have the capability to allow online data analysis, and to act as a focal point for the integration of high quality environmental data. The SWRCB will be adding thin-client database access screens by The Fall of 2000 to the site, which will allow "single entry, multiple use" of data to the database, reducing errors and costs and increasing efficiency in assessing environmental problems.

Work performed under the auspices of the U.S. Department of Energy by Lawrence Livermore National Laboratory under Contract W-7405-Eng-48.

Brendan P. Dooher is one of the scientists in a team of LLNL collaborators assisting the California State Water Resources Control Board in assessing and managing environmental and ground water resources. He received his Ph.D. from the University of California at Los Angeles, specializing in Systems Analysis and Probabilistic Risk Assessment. Dr. Dooher received both his BS and MS in Mechanical Engineering at UCLA, specializing in fluid flow and heat and mass transfer processes. He worked for several years as a research engineer for Pacific Gas & Electric Co. Dr. Dooher's current emphasis of study is in the area of risk assessment and management of resources, fate and transport in the environment, and the application of probability and information management to link these fields of research.

Direct Disposal of PCB-Radioactive and PCB-Mixed Wastes

Andrew E. Drom, Envirocare of Utah, Inc.

The management of Polychlorinated Biphenyls (PCBs) was significantly altered by the promulgation of new regulations during July of 1999 (40 CFR 761). The new regulations allow for the landfill disposal of a wide range of PCB wastes including PCB-Radioactive and PCB-Mixed Wastes. Previously, the United States Environmental Protection Agency had set forth regulation requiring destruction of Radioactive-PCB wastes through a permitted system such as an incinerator. The residues of this incineration were disposed in an appropriately permitted and licensed radioactive landfill. Certain PCB wastes, such as PCB-Remediation wastes with PCB concentrations exceeding 50 ppm, must be disposed in a landfill meeting Subtitle C disposal facility criteria. However, many types of PCB wastes, including Radioactive-PCB-Bulk Product Wastes, may be disposed in a Subtitle D landfill. The changes to PCB regulations now allow the DOE complex the opportunity to compliantly dispose much of the backlog PCB waste that has accumulated over the years. This new path forward is a welcome alternative to incineration and other impractical treatments for waste types such as soil and debris. The new regulations do not allow for landfill disposal of PCB liquid wastes.

Andrew E. Drom has been an employee of Envirocare for eight years. Prior to joining Envirocare, Mr. Drom spent nine years in the Naval Nuclear Propulsion Program as an Engineering Laboratory Technician. Currently, he is the Director of Technical Services, a position responsible for communicating all waste acceptance criteria, permit, license and shipping requirements to all Envirocare customers. His responsibilities also include reviewing and evaluating all customer waste profile and characterization information as well as resolving all nonconforming waste issues with shipping customers. Mr. Drom has a bachelor's degree from the University of the State of New York and a Master of Business.

Environmental remediation, Worker Safety, and Land Stewardship at the Rocky Flats Enviromental Test Site: Striking an Ethical Balance

M. Edelson; M. Svatos; R. Thompson; V. Burnett; L. Manion; and L. Sweeney, Ames Laboratory

Site remediation involves a tradeoff between environmental risks to the public and environmental and other occupational risks to workers. Tradeoffs also exist on the benefits side of the equation as decision makers and the public consider the value of clean up jobs, long-term employment, housing, open space, and so forth. The remediation and reuse of contaminated lands is a multidimensional problem involving science, technology, an appropriate balancing of risks, political factors, and effective communication that allows the public to fully consider the amount and distribution of risk and benefits in an open and ethical manner. For example, the release of contaminated sites requires that workers be exposed to significant risks during site remediation; the environmental remediation process may actually elevate public and environmental risks above those that exist while contamination is "contained" within site boundaries; the transfer of once-contaminated lands to the public for economic redevelopment may expose the public to unnecessary risks from residual contamination. Developing an optimal strategy requires balancing risks and benefits, ensuring that activities are ethically sound, and developing a sound understanding of potential alternatives for community land use so that communities can evaluate when it is in their best interests to pursue Federal lands that may be transferable under applicable Federal statutes. This work examines the tradeoff between risks at RFETS and contains preliminary results from in depth interviews with "stakeholders" in that area that tested support and understanding for a cleanup/stewardship plan that balances risks in an ethical fashion.

Martin Edelson is a staff member at the Ames Laboratory with an adjunct appointment at Iowa State University. He represented the Ames Laboratory on the DOE Laboratory Directors Environmental and Occupational/Public Health Standards Steering Group. This led to an interest in "risk" and the work proposed for the Technical Informaiton Exchange Program.

Establishing a Cost-Estimating System for DOE's Long-Term Stewardship Program

Joseph English and Peter Dahling, Project Performance Corporation

Over the next ten years, many Department of Energy (DOE) sites will undergo a transition from mission completion activities (i.e., environmental management) to long-term stewardship (LTS). As part of the planning process for LTS, these sites will need to prepare cost estimates for conducting LTS activities. This paper presents a method for developing a cost-estimating and planning system to support DOE's LTS program.

The uncertain scope of LTS activities and limited experience base implementing LTS are complicating factors in developing estimates. Current DOE cost estimating tools and accounting procedures do not provide adequate guidance for developing LTS cost estimates. Development of a LTS cost-estimating system required three components: 1) guidance defining LTS activities and costs; 2) procedures for integrating LTS cost estimates into existing DOE planning and budgeting systems; and 3) a cost-estimating tool to assist sites in developing standardized, comparable LTS cost estimates. To successfully assemble the first two components required an understanding of the different technical, administrative, and legal requirements driving LTS at different DOE sites as well as a broad understanding of DOE planning and budgeting procedures. The cost estimating tool was developed based on current DOE experience in developing LTS cost estimates for the Grand Junction Office-Long Term Surveillance and Maintenance Program and the Rocky Flats Environmental Technology Site. Development of the system incorporated lessons learned from similar activities with other environmental management programs, such as ensuring consistency of estimates prepared by various program offices.

Joseph English is a Senior Program Manager with Project Performance Corporation. He has 20 years experience managing and performing environmental restoration and waste management projects for DOE, DOD, EPA, and private industry. Mr. English holds B.S. and M.S. degrees in Civil Engineering from Oregon State University and is a registered professional engineer.

Peter Dahling is a Program Manager with Project Performance Corporation. He has seven years experience managing and conducting environmental management policy analysis, cost estimating, and strategic planning projects for DOE and private industry. Mr. Dahling holds a B.A. in Political Science from Williams College as well as masters degrees in Environmental Management (M.E.M.) and Public Policy (M.P.P.) from Duke University.

Deployment of an Alternative Closure Cover and Monitoring System for Corrective Action Units in Nevada

Thomas M. Fitzmaurice and Daniel G. Levitt, Bechtel Nevada

Monolayer closure covers, also known as evapotranspiration covers, are being recognized as an effective, relatively inexpensive option to traditional layered RCRA-type covers. Recent studies indicate that in the arid southwestern United States, monolayer covers may be more effective at isolating waste than layered covers due to desiccation and cracking of clay layers and subsequent development of preferential pathways through the waste covers. DOE Nevada has received regulator approval to deploy evapotranspiration covers at two Corrective Action Units. One is located at the Nevada Test Site. The other is located at the Central Nevada Test Area. Both deployments will consist of a monolayer cover of compacted native alluvium, instrumented with sensors throughout the cover profile to provide soil water content, water potential, and temperature data, in order to evaluate cover performance. Both covers will be revegetated with plants native to the area with the objective of establishing a stable plant community that maximizes water loss through transpiration and reduces water and wind erosion. Regulatory approval was acquired by maintaining communication with all stakeholders during site characterization and the subsequent technical analysis of the approved cover. Deployment of the closure cover and monitoring system for both sites is scheduled to occur in first quarter of fiscal year 2001.

Thomas Fitzmaurice is a hydrologist with Bechtel Nevada who has supported Waste Management and Environmental Restoration activities at the Nevada Test Site for the past six years. He has a M.S. degree in hydrology from the University of Arizona, and a B.S. in Forestry from Northern Arizona University.

Tank 19 Folding Crawler

Robert Fogle and Thomas Nance, Westinghouse Savannah River Company

The Department of Energy (DOE) is committed to removing millions of gallons of high-level radioactive waste from 51 underground waste storage tanks at the Savannah River Site (SRS). The primary radioactive waste constituents are strontium, plutonium, and cesium. It is recognized that the continued storage of this waste is a risk to the public, workers, and the environment. SRS was the first site in the DOE complex to have emptied and operationally closed a high-level radioactive waste tank. The task of emptying and closing the rest of the tanks will be completed by FY28. The tanks were built underground to provide shielding from the intense radiation fields emitted by the highly radioactive waste. Operations, maintenance, and waste handling are done under strict radiological controls to avoid direct personnel exposure and prevent the spread of contamination. The waste from each tank will be transferred to a waste pretreatment facility and then on to the Defense Waste Processing Facility where it will be vitrified and poured into stainless steel containers. The removal of the waste from the tanks involves installation of mechanical agitators or mixers and pumping systems on each tank to re-dissolve the precipitated waste salts and suspend insoluble waste solids. Large amounts of corrosion-inhibited water are added to the tank. Advanced mixers suspend the insoluble sludge or dissolve the salt cake that has formed. The pumping system will remove the waste slurry from the tank. After waste removal, the interior of each tank is washed with water. Each tank is isolated physically by capping and sealing all pipes as well as cutting all electrical connections. Finally, the tank is filled with grout.

The next tank scheduled for decommissioning is Tank 19F located in F-area. Based upon decommissioning guidelines, the goal is to leave no more than 1000 gallons of material in the tank upon closure. A hardened mass of solid waste material, known as a heel, was observed lying at the bottom of Tank 19F during a previous inspection. The heel was described as an hourglass shaped mound located in the center of the tank. It is presently not known whether this heel still exists. However, the heel composition could consist of more than a 1000 gallons of material and thus would necessitate reparation. The agitators/mixers may have little effect upon this mass. A spray system comprised of a high pressure, adjustable water nozzle was used in previous tank closure processes. It is felt that this nozzle may be able to break up the tank heel if operated at close range. Once the heel is broken up, the mixers and pumps will be effective in removing the material from the tank. In planning for tank heel mitigation, the High Level Waste (HLW) Division requested assistance from the Savannah River Technology Center's (SRTC) Engineered Equipment and Systems Department (EES). The request called for EES to design, fabricate, assemble, and test a remote-controlled crawler that could carry a high pressure, water nozzle in Tank 19F.

Robert Fogle is a Fellow Engineer with the Westinghouse Savannah River Company. He is the lead technical engineer for the site's robotics program. Mr. Fogle is very active in applying remote controlled technology to field applications such as size reduction of large, radioactive components, contaminated soil removal, radioactive source handling, and performing visual and radiological surveys in underground pipelines. Additionally, Robert has developed a common computer platform that is installed on a wide variety of teleoperated vehicles at the Savannah River Site. He has authored and presented a number of technical papers on his application and development experiences. Robert has also served as session organizer and session chair at several international robotics conferences for the American Nuclear Society and the IEEE. Mr. Fogle has a degree in Electrical and Computer Engineering from Clemson University.

An Evaluation of Current Operation and Maintenance Guidance and Activities

Jennifer Fryer; Robin VanHorn; and Amadeo Ramos, Becthel BWXT, Idaho National Engineering and Environmental Laboratory

The Idaho National Engineering and Environmental Laboratory (INEEL) is a Department of Energy facility. This facility was listed on the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) National Priorities List on November 21, 1989. The INEEL's Environmental Restoration department is currently working through the CERCLA process at the laboratory based on its Federal Facility Agreement and Consent Order. Operation and maintenance (O&M) of these CERCLA remedial actions are a fundamental part of the protection of human health and the environment and are required to maintain the effectiveness of the response actions. Research was conducted at INEEL to determine the amount of guidance available to remedial project managers planning and conducting long-term operation and maintenance of remedial actions. Guidance documents were reviewed from EPA headquarters and regional offices, DOE headquarters and major laboratories, and the Army Corps of Engineers. While numerous guidance documents detail steps in remediation activities little detail on O&M is included, even when the guidance specifically covers long-term remediation activities. The results of this literature evaluation will be presented and suggestions for selected topic in O&M planning that INEEL remedial project managers should consider when writing or reviewing O&M plans.

Jennifer Fryer has been a research fellow at the Idaho National Engineering and Environment Laboratory for the past three summers. Now in her fourth year as an INEEL fellow, she is currently co-authoring a large remedial investigation/feasibility study. Ms. Fryer will be pursuing her Ph.D. in Environmental Engineering at the University of California-Davis in the fall.

Stakeholder Interaction: Public Endorsement of LLW Disposal in Trenches Instead of More Robust Vaults

W. T. Goldston, Westinghouse Savannah River Company

Low-Level radioactive waste (LLW) disposal practices at Savannah River Site have evolved from exclusively trench disposal to disposal in large, robust, concrete vaults. As a result of investigation the technical basis for vault disposal, it was discovered that some LLW materials that were being disposed in vaults actually met the technical criteria for vault disposal in trenches. Vault disposal is much more expensive than trench disposal, so trench disposal is preferred if it can be demonstrated to meet all technical requirements. The public, through the SRS Citizens Advisory Board (CAB), and the regulators had been advocates of vault disposal and had become convinced that vault disposal was the only environmentally acceptable method for LLW disposal at SRS.

The challenge: Provide the public and regulators with the appropriate and convincing information that would allow public endorsement of trench disposal when the perception was that only vaults would provide the environmental protection required.

This paper will trace the strategy developments, DOE approval process, and stakeholder involvement program that resulted in public endorsement of the SRS disposal of LLW in trenches that previously was perceived to require isolation in robust concrete vaults.

W. T. (Sonny) Goldston has 25 years of experience in the Nuclear and Chemical Engineering fields, and has served in various capacities at the Savannah River Site and around the DOE complex on assignments. Mr. Goldston holds a B.S. in Chemical Engineering and a Masters in Business Administration from the University of South Carolina. He is currently assigned to British Nuclear Fuels in the Solid Waste Division as part of the Westinghouse Savannah River Company's contract to operate the Savannah River Site. As such, he is serving as manager of the SRS Solid Waste Division's Performance Assessment program including the SRS efforts to comply with DOE requirements for a LLW Composite Analysis leading to a DOE Approved LLW Disposal Authorization Statement. In the recent past, Mr. Goldston was involved in resolution of technical and safety issues associated with hydrogen buildup during the venting of stored TRU waste drums. Mr. Goldston is former Manager of Solid Waste Engineering, Saltstone Engineering, and has served as Manager of the Waste Qualification, environmental compliance and safety analysis programs in the Defense Waste Processing Facility. His career includes serving with the Department of Energy as manager of the chemical reprocessing, offsite spent fuels, and Pu-238 Space Nuclear Fuels programs.

Automated Data Acquisition Systems for Stewardship and/or Remote Field Measurement, Monitoring, Control, and Telemetry

Wesley Goodwin, Geomation, Inc.

Geomation, Inc., designs and manufactures distributed data acquisition and control systems for a variety of environmental, geotechnical, and process monitoring applications. System architecture and design have been optimized to provide reliable performance in time-critical monitoring and control applications in non-powered, remote environments. Our System 2300 is comprised of standard product building blocks, called Measurement and Control Units (MCUs), which employ a distributed intelligence system architecture and a robust communications protocol. Reliability, ease of programming and ease of maintenance are key factors in our many successful DOE implementations. By providing standard, field proven hardware and software product platforms, we can offer an easy to implement, low risk solution to your active monitoring or long term stewardship requirements.

No bio submitted.

Preliminary Results of Wetlands Natural Attenuation Monitoring for TCE at the Savannah River Site

Blake E. Hart; Jeff Ros; Gregory B.Rucker; Phillip Albenesius; Jerry Nelsen; Gary Mills; and John B. Williams, Bechtel Savannah River Company

At C-Area Burning Rubble Pit (CBRP), Savannah River Site, a groundwater plume containing trichloroethene (TCE) outcrops some 1200 m away into former lakebeds and stream wetlands area of about 12 acres. Vapor extraction and air sparging are being employed at the source of the TCE plume. A strategy consisting of placement of three separate systems of monitoring wells plus surface water sampling has been implemented. The systems include (1) wells along the long axis of the plume, from source to near outcrop; (2) shallow, nested peripheral water table wells adjacent to the wetlands; and (3), multi-port wells within the wetlands, downgradient from the peripheral wells. Utilization of vapor diffusion samplers has been very helpful in location selection of peripheral and multiport wells. These groundwater monitoring systems and surface water will be sampled for a common list of monitored natural attenuation (MNA) constituents. All of these provide data to define MNA processes. Data collected to date indicate oxic groundwater conditions with significant TCE and low dichloroethene (DCE) concentrations compared to wetland surface waters with DCE and vinyl chloride (VC), anaerobic degradation products of TCE. Tentative interpretation of data indicates anaerobic degradation of TCE is occurring in the organic-rich wetland sediments.

Blake Hart is presently an ecological risk assessor in Environmental Restoration at the Savannah River Site where he has worked for the past 10 years. Dr. Hart received a Ph.D. from the University of Oklahoma, M.S. from Utah State University, and M.S.E. from the University of Kansas.

Can We Parameterize Stochastic Models of Flow and Transport in the Vadose Zone?

Robert Holt, The University of Mississippi; John Wilson, New Mexico Institute of Mining and Technology, Department of Earth and Environmental Sciences; and Robert Glass, Sandia National Laboratories

Heterogeneous vadose zones underlie many DOE facilities and are the primary pathway for contaminants to reach the water table. Many stochastic approaches have been developed to probabilistically model heterogeneous flow and transport. In these models, spatial variability of hydraulic properties is described by spatial statistics. Errors in these spatial statistics will affect stochastic model results.

A Monte Carlo approach is used to evaluate error in spatial statistics and stochastic model results caused by measurement errors in field- and laboratory-estimated hydraulic properties. In particular, tension-infiltrometer estimates of the saturated hydraulic conductivity (Ks) and the exponential relative permeability parameter (alpha) and laboratory estimates of the van Genuchten (VG) parameters, used to describe the moisture retention curve is considered. Only small, simple observation and inversion-model errors, such that measurement conditions are essentially "ideal" are incorporated. Nevertheless, measurement errors preclude reliable estimation of spatial statistics for Ks, alpha and the VG parameters, generate "non-physical" cross-correlation between parameters, and cause significant error in stochastic model results. Because measurement errors cannot be characterized a priori and measurement errors increase uncertainty in estimates of spatial statistics, robust stochastic modeling of flow and transport is not possible using field- or laboratory-estimated unsaturated hydraulic property data.

Robert Holt has a Ph.D. is in Hydrology from New Mexico Institute of Mining and Technology, He has over sixteen years of applied research experience at U.S. Department of Energy (DOE) facilities in sedimentary geology, geostatistics, and saturated and unsaturated flow and transport processes in heterogeneous porous and fractured media.

Validation of the Local SRS Coordinate System

David M. Isiminger, Jr.; Scott McMullin; Bruce Reeves; and Larry Koffman, WSRC/Environmental & Geographical Information Systems (E&GIS)

A wealth of extremely accurate spatial data for facilities and infrastructure is available in the engineering drawings and maps of the Savannah River Site (SRS). Most, if not all, of these data are geographically registered to the SRS Coordinate System, a simple rotation and translation from NAD27 South Carolina State Plane. As implementation of GIS began at SRS, a necessary part of that implementation has been the migration of these data to GIS base map themes providing GIS users at SRS with data far exceeding the accuracy's available from commonly used sources such as U.S. Geographic System. Problems were encountered when beginning to combine and over lay SRS native data with data registered to other coordinate systems such as UTM. Anomalies were evident that led us to believe that our native SRS base maps were not as accurate as expected. After extensive study and analysis including field research, terrestrial surveys and first order GPS surveys of historical control baselines, we discovered that our spatial data was as accurate as expected. Our coordinate system was distorted. Our conversion algorithms assumed the coordinate grid to be square. Not a valid assumption for non-geodetic survey control established in the early 1950's.

David M. Isiminger, Jr., is a Senior Engineer with nineteen years of experience. He holds a Bachelor of Science Degree in Civil Engineering and has been a GIS professional for 3 years. Mr. Isiminger has extensive experience with Intergraph MGE, Geomedia, and ESRI ArcView.

Application of Polyurea to Prevent Moisture Infiltration at Interim Action Soil Site

Peggy Jessmore and Michelle Kaptein, BBWI

For the Operable Unit (OU) 3-13 Group 1 Soils Interim Action, a spray on polyurea cover is planned for the Idaho Nuclear Technologies Center Tank Farm area (phase 2) and the 150' perimeter areas (phase 1) pending the outcome of a product demonstration. Total area to be covered is approximately 6 acres. The primary purpose of the cover is to minimize infiltration and divert precipitation away from contaminated areas, as promulgated in the OU 3-13 Final Record of Decision. Prior to the application of the tank farm cover, a demonstration is planned to assess various product performance criteria. Three vendors have been selected to participate in the demonstration scheduled to occur in April 2000. Research conducted to date indicates that polyureas have not been used in this application. The Idaho National Environmental and Engineering Laboratory will therefore be the pioneer in this arena. Presentation topics will include discussions relating to the polyurea demonstration including the application process, performance criteria and performance results, and the phase 1 application, since phase 2 application is not scheduled to occur until 2001.

Peggy Jessmore and Michelle Kaptein currently work on Waste Area Group (WAG) 3 projects in the Environmental Restoration Department at the Idaho National Engineering and Environmental Laboratory located in Idaho Falls, Idaho, where they have worked for 13 years and 10 years, respectively. Degrees consist of a B.S. in Geology, and a B.S. in Mechanical Engineering/M.S. in Waste Management.

GWRTAC's "Groundwater Central©": Portal to Groundwater Information on the Web

Dawn S. Kaback, PhD and Diane Roote, GWRTAC/CTC; Grover Chamberlain, U.S. Department of Energy

The Ground-Water Remediation Technologies Analysis Center (GWRTAC), operated by Concurrent Technologies Corporation (CTC) and the University of Pittsburgh, provides innovative ground-water and soil remediation technology information through its web site at www.gwrtac.org and via outreach activities. GWRTAC is co-funded by the U.S. EPA, the U.S. DoD, and the U.S. DOE. At the TIE Workshop, GWRTAC will debut the "Groundwater Central©" portal, a centralized platform organizing links to existing web-based information into a searchable framework. Included will be technology descriptions, performance and cost, case studies, site visits/demonstrations, conferences, workshops, RFPs, etc. This systematic effort to link existing resources together at the sub-page or downloadable file level at a single web-site location is unique and will be a valuable resource. Groundwater Central© will be link-based, so the database content will be that needed to define the information type, source, topic, hyperlink, and link description. Hyperlinks will direct the user to websites with available information, where documents can be downloaded, or where databases can be searched for desired information. GWRTAC is working with members of the Federal Remediation Technologies Roundtable (FRTR) to design the portal and associated database.

Dawn Kaback has over 20 years' environmental experience, concentrating on environmental technologies. She received her Ph.D. in geochemistry from the University of Colorado, has served on a National Academy of Science Committee, is a National Ground Water Association Director, and is an editor for Ground Water Monitoring and Remediation.

To Purge - or Not to Purge Is there really any question?

Thomas Wayne Kabis, SIBAK Industries Limited, Inc.

This paper reviews the history of groundwater sampling and explores, in depth, the original reasons for purging and the acquisition of physical the parameters; hydronium ion content (pH), dissolved oxygen (DO), temperature (T), electrical conductivity (eC), dissolved solids (nTu), and turbidity. The question of whether to purge or not to purge has swept through the environmental industry both across the nation and around the world. Recent developments in sampling technology have made the short answer to this question very simple - there is no longer any need to purge most wells prior to sampling. This is due in large part to a new sampling device that is easy to use, easy to decontaminate, samples directly into the sampling container, is readily commercially available, has been evaluated by the United States Environmental Protection Agency (USEPA), and is capable of taking discrete point-interval samples (DPIS) with a replicability of 99%.

The KABIS Sampler(TM) has been tested extensively by the United States Environmental Protection Agency (USEPA) to which the USEPA has stated that there is, "...no significant difference between the KABIS Sampler(TM) and the EPA reference method." Since the KABIS Sampler(TM) samples were obtained without the benefit of purging; this is regulatory agency proof that when using such a sampling device, the act of purging is inconsequential. Since the need for purging using such a device is obviated, then too, is the need for the collection of physical parameter data obviated.

Thomas Wayne Kabis is Vice President of Research & Development and Director of Operations for SIBAK Industries Limited, Inc., of Wilmington, Delaware. He has more than 24 years of experience in performing geologic and hydrogeologic investigations, R-1 stream-reach and hydrological surveys, geochemical and geophysical surveys, hazardous waste remedial investigations, feasibility studies, and remediation designs and installations. Mr. Kabis is a contributing author to books covering topics on standard operating procedures for LUST investigations, PHASE-I Site Assessment procedures and protocols, and recent upgrades to both ASTM and government standards regarding sampling procedures. His most recent work has involved the investigation of representative sampling schemes for the delineation of environmental contaminant plumes. He is the author of a new RBCA computer program (ReBeCcA) and holds patents to the KABIS Sampler(TM), the SVPET(TM) Vapor Testing System, the Model 8604 PBDS Groundwater Scrubbing System (for MTBE and other contaminants), and other environmental remediation and testing devices.

Deployment of Multiple Waste Technologies To Optimize Overall Remediation Objectives

Mr. Jeffrey Kulpa, Earthline Technologies

The Ashtabula Environmental Management Project (AEMP) has developed, demonstrated, and and deployed an integrated remediation approach which uses on-site treatment as the principle mechanism for dealing with a significant but distinct subsurface CAMU groundwater problem, PCB/uranium-contaminated soils, and over 1,000 cubic yards of legacy mixed waste which exists in many small volume waste streams.

The on-site treatment approach has the advantage of providing local control over schedule and risk issues as well as lowering off-site treatment and disposal costs that can be very significant when dealing with a multitude of small volume mixed waste streams. The integrated treatment approach implemented by the AEMP uses several technologies such as soilwashing (for metals and/or organics,) non-intrusive subsurface characterization, prefabricated vertical drains, molten salt oxidation, polymer macroencapsulation, polymer microencapsulation, compression forming, and molten aluminum processing. The deployment of these technologies allows the AEMP to cost-effectively meet federally mandated milestones and also prepares the site for managing unplanned wastes that may emerge as remediation continues.

Finally, the intent of AEMP is to buy commercial treatment services where it is cost-effective to, and simultaneously make a new genre of technologies available to other DOE-OH closure sites that are faced with similar disposal problems.

Jeff Kulpa has over 28 years of experience in the startup, operation, maintenance, and analysis of nuclear and non-nuclear facilities. He has 10 years of experience at DOE Facilities providing operations and technical support in all D&D, waste management, environmental restoration, and operational areas for various nuclear material processing facilities. He is currently directing multiple projects associated with facility/equipment/material disposition, decommissioning, and waste management of a DOE Uranium Processing Facility.

Back to the Future: Using GIS Technologies and Historical Photography to Support Waste Site Characterization and Remediation

Halkard E. Mackey, Jr., Westinghouse Savannah River Company

Since the formation of Savannah River Site (SRS) in 1951, documentation of facilities and waste site operations is included in a remarkable database of 40,000 frames of photography. As Geographical Information Systems (GIS) technologies have advanced, key portions of this historical record have been scanned, geo-referenced, and made available on-line for evaluation of historical changes. Reviews indicate that information on operational history, physical extent, surface history, types of waste material, locations and numbers of pits or trenches, and potential dates of use can be evaluated. This database supports reviews of the over 500 waste sites on SRS for work plans, characterization and sampling programs, ecological risk assessments, and closure of waste sites in a more cost-effective manner.

Halkard E. Mackey received his Ph.D. (1970) from the Univ. of Tennessee with honors with a degree in Biological/Environmental Sciences and a MS (1979) in Environmental Impacts of Energy Development from the Univ. North Carolina. Having taught environmental sciences, he jointed the professional staff at the SRS in 1979 where he was involved in a number of environmental assessments and statements for numerous SRS projects. Dr. Mackey's primary areas of interest are in the application of GIS technologies and remote sensing to environmental assessments and decision making.

Technology Safety Data Sheets: A Tool to Protect Workers from the Hazards of Environmental Clean-up Technologies

Barbara McCabe, Operating Engineers National Hazmat Program and Bruce Lippy, CIH, CSP

Approximately 2 to 3 billion dollars is being spent annually by the federal government on research, development, and demonstration programs for new clean-up technologies. Unfortunately, worker health and safety considerations have not been routinely included in the design of these technologies and there have been several fatalities. Taking the lead in correcting this deficiency, the DOE has been pilot testing an informational tool for providing workers, industrial hygienists, safety professionals, and other stakeholders with guidance on avoiding potential hazards in individual technologies. The Technology Safety Data Sheet (TSDS) is a technology-specific document designed to provide the identity and relative risk of safety and health hazards associated with the technology. It can be used as a tool to manage safety throughout the technology development and implementation process and provide developers with a method to collect and report hazard information in a form that is understood by the user community. Guidelines from a consensus document developed through a national technical workshop recommends the elements to be contained in the TSDS and these will be discussed during the poster session.

Barbara McCabe is the Program Manager/Principal Investigator for the Human Factors Assessment of Environmental Technologies Program cooperative agreement with the Department of Energy. She is an Industrial Hygienist and a Certified Audiologist.

Bruce Lippy is a Certified Industrial Hygienist and Certified Safety Professional with the Human Factors Assessment of Environmental Technologies Program. He is currently pursuing his doctorate in regulatory policy.

A Cost-Effective Approach to Multi-Parameter Hydrologic Monitoring to Characterize Ground Water Flow Conditions

Katherine Monks, Tetra Tech EM Inc. and Mike Godwin, Morrison Knudsen Corporation

This presentation will discuss a cost-effective approach that uses three techniques to characterize the hydraulic properties of a multi-aquifer system. In addition to data gathered through traditional quarterly ground water level monitoring, continuous measurements are collected from in situ velocity sensors and pressure transducers to characterize ground water movement originating from a naval air facility to an adjacent community. A primary tool of the investigation, the in situ ground water velocity sensor, was developed in conjunction with the Technology Deployment Initiative Institute for the Department of Energy (DOE).

The multi-parameter hydrologic monitoring provides a cost-effective alternative to "traditional" ground water flow characterization. The primary advantage is that ground water flow data are collected continuously with greater horizontal and vertical coverage over a 1- to 2-year period. This approach provides greater coverage over a longer duration than conventional aquifer testing and water level monitoring, which is limited to a discrete zone of influence over a much shorter time frame. The data collected from the velocity sensors and pressure transducers, coupled with the ground water level data collected quarterly from a regional monitoring well network, will be used to understand and predict changes in ground water gradients and flow directions from such influences as regional water supply pumping.

Katherine Monks is a senior hydrogeologist with Tetra Tech EM Inc. She has over 15 years experience in hydrogeology, ground water modeling, and hydrogeochemistry. Ms. Monks has managed numerous DOE and Department of Defense (DoD) remedial investigation/feasibility studies, water resource projects, and Environmental Impact Statements.

Mike Godwin is a California-registered geologist with Morrison Knudsen Corporation. He has 12 years of experience with a variety of soil and ground water investigations and remedial actions for private industry, DOE, the Environmental Protection Agency, and DoD.

Sodium Recycling Utilizing Wet-Vapor-Nitrogen Processes

Roger M. Moore and Earl Peterson, Boeing Rocketdyne and John Engott, Safety-Kleen

Wet-Vapor-Nitrogen (WVN) processing of sodium at elevated temperatures has been successfully used to recycle sodium metal into sodium hydroxide for the Closure of the Energy Technology Engineering Center, Santa Susana Field Lab, California. This cleaning process also allowed the recycling of stainless steel piping and components from sodium component test facilities. A significant cost reduction was made by utilizing elevated temperature processing over ambient temperature processing. Lessons learned and best practices are discussed.

Roger Moore is the Boeing Project Manager for Sodium Facilities at the former Energy Technology Engineering Center undergoing closure by the DOE. He has 30 years experience in the design, construction, operations, and demolition of nuclear and non-nuclear facilities. Mr. Moore's bachelor's degree is in Mechanical Engineering with a Masters Degree in Business. He participated in the Point Beach (Wisconsin) Nuclear Plant, Arkansas Nuclear One, San Onofre (California) Unit 2, and various facilities supporting the Liquid Metal Fast Breeder Reactor technology in the US.

Separation and Concentration of Actinides in Natural Waters Using a Magnetic Filtration/Sorption Process

James D. Navratil; Alena Paulenova; and Timothy A. DeVol, Clemson University

Numerous methods have been used for pre-analysis separation and concentration of actinides, such as plutonium and americium, from natural water samples. Evaporation and iron-carrier caustic precipitation have been the most common preconcentration methods used at contract laboratories for ground water samples from U.S. Department of Energy sites; the resulting sample residue is then typically dissolved in an acidic solution followed by actinide isolation and final preparation for radiometric detection. These preconcentration methods suffer from relatively high labor and energy requirements as well as having the potential of cross-contamination from laboratory glassware, etc. Sample cross-contamination can also occur from contaminated equipment, dust, etc., during sampling operations.

This paper introduces a new inexpensive technique, magnetic filtration/sorption, as a potential field sampling method for separating and concentrating actinides from ground water. The proposed method has the potential to reduce field cross-contamination problems, as well as reduce sample transportation and analysis costs. The proposed method can also be utilized in the laboratory to replace evaporation or precipitation steps, while potentially determining the speciation of different forms of actinides.

The method utilizes a small column of supported natural magnetite or iron ferrite (FeO.Fe2O3) surrounded by an external magnetic field. In the presence of the external magnetic field, enhanced capacity was observed in using supported magnetite for removal of actinides and heavy metals from wastewater. The enhanced capacity is primarily due to magnetic filtration of colloidal and submicron particles along with some complex and ion exchange sorption mechanisms. The removal of the magnetic field from around the column and use of a regenerating solution elutes the actinides loaded on the magnetite.

Jim Navratil is Profesor of Environmental Engineering and Science. He was an Engineering/Scientific Fellow at the Idaho National Engineering and Environmental Laborator for three years and Chief Scientist for Waste Management Nuclear Services (WMNS) for another three yeas prior to his appointment at Clemson in January 2000. Mr. Navratil has spent most of his career at Rocky Flats with leaves of absence, each of three years, at the International Atomic Energy Agency and University of New South Wales. Prior to joining WMNS he was at DOE's Energy Technology Engineering Center in California for three years.

New Materials and Matrices for Immobilization of Transuranium Wastes

Alexei K. Pikaev, Institute of Physical Chemistry of Russian Academy of Sciences

The Institute of Physical Chemistry of Russian Academy of Sciences has developed new materials and matrices for transuranium-containing waste management. These were prepared on the base of stone casting. The systems can be used as material for production of various facilities and items (stone casting itself) and for immobilization of alpha-emitting radionuclides separated from liquid radioactive wastes (basalt and basalt-like ones). The report summarizes the most important results (radiation and chemical stability, strength, microhardness, porosity, water adsorption, etc.) obtained from the respective research.The conclusion drawn from the results consists in the fact that the systems are very stable against thermal, chemical, and radiation action.

Alexei K. Pikaev graduated from Moscow State University. He holds a Ph.D. and a D.Sci., Dr. Pikaev is a Professor, a Corresponding Member of RAS, Deputy Director and Head of Laboratory at the Institute of Physical Chemistry of RAS (Moscow). Areas of his scientific interests are radiation chemistry and technology, radiochemistry including radioactive waste management. Dr. Pikaev is the author of about 600 scientific papers, reviews and patents and 13 monographs.

GIS Projects for Environmental Restoration at the Savannah River Site

Tracy Rea, Bechtel Savannah River, Inc. and David Nix, Westinghouse Savannah River Company

Several different divisions work in conjunction with the Environmental Restoration Division (ERD) at the Savannah River Site (SRS) in order to accomplish remediation tasks. Employees with expertise in a variety of areas comprise project teams which work together to accomplish a common goal. ERD project teams were seeking development of a common framework to provide conformity for capturing and sharing project-related data. Additionally, analytical tools were needed to perform data analysis and interpretation for geochemical and geophysical data in a spatial environment.

A Geographic Information System (GIS) was used to assist users in ERD by creating a common workspace for data analysis and interpretation, allowing access by all team members. The key to centralizing the storage and sharing of data among each of the team members was the establishment of basic ArcView project and data files.

Scripts for data analysis and interpretation are being developed to assist the project teams in presenting the results of data gathering efforts. These scripts will allow the project teams to quickly and efficiently analyze multiple scenarios for data analysis and presentation.

Since all of the team members are given access to the data and project files, cohesivenss and efficiency have increased. It has become much easier to determine where data gaps exist, analyze and summarize existing data, as well as to integrate data from other team projects. The improved quality of ERD data presentations to state and federal regulatory agencies using ArcView project system has resulted in streamlined project timelines with significant improvement in quality and cost/manpower savings.

Tracy Rea received a BS in Biology, with a minor in Chemistry, from Eastern Kentucky University. For six years, she worked as a research technician in the GIS/RS lab at the University of Georgia's Savannah River Ecology Lab. Since 1998, Ms. Rea has been with the Environmental and Geographic Information Systems section at the Savannah River Site.

David Nix received a BS in Biology, with a minor in Chemistry, fro the University of South Carolina at Aiken, and and MS in Molecular Biology from the University of South Carolina at Columbia. Mr. Nix currently works in the Environmental and Geographic Information Systems section at the Savannah River Site. He has over 20 years experience as a chemist and environmental scientist working in the pharmaceutical industry, state regulatory agency, and at the Savannah River Site in environmental restoration.

"LandTrek" Your Land Transfer/Reuse Website

Jon Sink and Henry J. Nachtsheim, III, US Deptartment of Energy, Grand Junction Office

LandTrek is a set of project management, decision-making, and communication tools on an interactive World Wide Web site that can assist with the transfer of government-owned land and facilities to other government agencies or the private sector. As federal facilities complete their missions, land and buildings become available for lease or ownership by other agencies and the public. The website offers tools to help project managers promote collaborative decision making, select cost-effective solutions, benefit from lessons learned, gather data, manage or mitigate project risks, establish due diligence record keeping, and create shared ownership of cleanup decisions. Through roadmaps, LandTrek can help stakeholders and decision-makers involved in the transfer of federal land navigate through the regulatory and legal processes that begin with identification of potentially available land and facilities. The website features improved access to information with a general guidance and reference section, a library resource, checklist templates for land transfer and reuse activities, links to lessons learned, search capabilities, and several pilot sites. Information on the pilot sites includes project schedules, building descriptions and photographs, interactive discussion forums, and status charts that relate to land reuse or transfer activities for U.S. Department of Energy and U.S. Department of Defense facilities.

Jon Sink is Program Manager for the DOE Grand Junction Office LandTrek Website.

SRS Environmental Restoration Engineering & Technology

Ahmet Suer, Bechtel Savannah River

SRS environmental Restoration Engineering & Technology and Project Team has identifies technology needs for FY2000. The Technology Needs Statement reflect the technolgy challanges for FY2000. Poster includes:

- SRS Groundwater strategy
- SRS Innovative Technology Deployments
- Remediation Technology Stategy for next generation.
- Evolution of Remediation at SRS

Ahmet Suer has 27 years of experience ranging from Environmental Restoration to construction; full spectrum of Environmental Projects. Mr. Suer is presently employed by Bechtel Savannah River Inc., Previously, Mr. Suer managed SUPERFUND projects in EPA egion II. He has a M.S. degree in Engineering from New York University.

SRS Site Technology Coordination Group

Ahmet Suer, Bechtel Savannah River and Sherri Robinson, Department of Energy

The Savannah River Site (SRS) Site Technology Coordination Group represents SRS organizations and their Technolgy Need Statements. The STCG promotes technologies needs and finds solutions to technology challanges.

To address the widespread and diverse SRS technology challanges, the STCG promotes technology development and deployment. It is a technology driven organization.

The poster presents:

Technology development strategy

Technology deployments at SRS

The STCG is the DOE lead organization with contractor representatives from each department. It provides fully integrated, technically defensible solutions for cleanup and long term stewardship at SRS.

Ahmet Suer has 27 years of experience ranging from Environmental Restoration to construction; full spectrum of Environmental Projects. Mr. Suer is presently employed by Bechtel Savannah River Inc., Previously, Mr. Suer managed SUPERFUND projects in EPA egion II. He has a M.S. degree in Engineering from New York University.

Historically Black Colleges and Universities Program at SRS

Ahmet Suer, Bechtel Savannah River and Tania Smith, Department of Energy

Historically Black Colleges and Universities (HBCU)are working with the Savannah River Site (SRS) Environmental Restoration (ER) Program towards to cleanup and long Term Stewardship. The HBCU program has 6 universities that are working with ER. Their tasks includes compliance related tasks. In addition, DOE-SR, the US Forest Service, and the University of South Carolina has established the SRS Field Station to help HBCU students in the broad range of environmental science, resources management, environmental engineering.

SRS-FS has 26 colleges and university members. It has recieved the prestigious Hammer Award in 1999.

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The WasteoScope: An ArcView Application for Categorizing Buried Waste At Idaho National Engineering Laboratory

Luke White; Bruce Becker; Larry Slate; and Clem Potelumas, BBWXTI, Inc.

In order to support the Remedial Investigations and Feasibility Studies at the Radioactive Waste Management Complex at Idaho National Engineering Laboratory, a comprehensive database of disposal shipping information and disposal site operations information has been married with several types of geophysical and mapping information, and all of this information has been neatly organized into an ArcView application. The resulting application has been very favorably reviewed by state and federal regulators and demonstrated to DOE-HQ staff. The application is being used to facilitate planning for current and future Remedial Investigations and Feasibility Studies activities. This paper will discuss the preliminary research that was done prior to the the assembly of the database, relate some significant success stories in the use of the database, describe some problem areas that we have encountered in developing, fielding, and using this application, and describe the future plans for moving this application to the internet using ArcView IMS for use by a wider group of INEEL users.

Luke White is the Director of the Spatial Analysis Laboratory at the Idaho National Engineering and Environmental Laboratory. He has been a practicing software engineer for 25 years, and has been active with GIS since 1989. Mr. White holds a BS in Geology and has extensive masters' work in environmental engineering, software engineering, and environmental chemistry. He has authored over thirty GIS-related papers.

Remediation of Radiologically Contaminated Sites at Waste Area Group 2 OU 2-13

Deborah Wiggins, Bechtel Babcock and Wilcox Idaho

For the Remedial Action of Waste Area Group OU 2-13 in the 1999 Field Season, a Removal Action was performed. The equipment used to perform this work allowed the subcontractor to save the project team over $800,000 dollars. The equipment used also helped the subcontractor finish a full month and half ahead of schedule. The use of Miskin Scrapers and four wheel drive farm tractors allowed the subcontractor to fill several ponds without using the conventional method of using end-dumps and frontend loaders. The width, length, and depth of these ponds precluded the use of scrapers and earth movers from being utilized on this project. The subcontractor was able to use the combination of tractors and eight cubic yard tow-type scrapers to remove topsoil from a stockpile and place it in the bottom of the ponds. This equipment required less maintence than heavy construction equipment as well as the obvious time and money savings of additional equipment and labor, Presentation topics will include the discussion of the actual Remedial Action, time/cost savings, and function of the Miskin scraper in this application.

Joseph A. Landis has worked in the construction field for more than 10 years and has been involved in Environmental Remediation project for the last 5 years. Mr. Landis currently is working on Waste Area Group (WAG) 2, 3, and 4 projects at the Idaho National Engineering and Environmental Laboratory located in Idaho Falls and Scoville, Idaho.